



# **LASER MAGNETIC STORAGE INTERNATIONAL COMPANY**

**TAPE STORAGE DIVISION**

---

---

**49768900**

## **STREAMING TAPE UNIT 92181 SERIES HARDWARE MAINTENANCE MANUAL**

**GENERAL DESCRIPTION  
OPERATION  
INSTALLATION AND CHECKOUT**

---

A PHILIPS AND CONTROL DATA JOINT VENTURE



# REVISION RECORD

REVISION	DESCRIPTION
01 (3-08-84)	Preliminary Release.
02 (5-31-84)	Preliminary release, manual restructured.
A (7-06-84) Series Code 15	Released
B (11-02-84) Series Code 15	This revision incorporates technical changes and corrections affecting pages: 1-2, 1-8, 1-9, 2-7, 2-8, 2-10, 2-11, 2-12, 2-14, 3-7, 3-8, 3-9, 3-16, 3-17, 3-31, 3-34, 3-35, 3-37, 3-38, 3-40.
C (3-22-85) Series Code 16	This revision incorporates technical changes and corrections affecting pages: 1-11, 2-4, 2-6, 3-14, 3-16, 3-17, 3-18, and added page iib. ECO PB 51615 N/A.
D (5-24-85) Series Code 16	This revision incorporates technical changes and corrections affecting pages: 3-35 and 3-37.
E (8-28-85) Series Code 17	This revision incorporates technical changes and corrections affecting pages: viii, 1-9, 1-10, 1-11, 3-2, 3-21, 3-22, 3-23, 3-29.
F (1-22-86) Series Code 18, 19, 20	This revision incorporates ECO 51483 affecting pages: ii, 3-35, 3-36, 3-37, 3-42. ECO's PB 51833A and 51955 N/A to this manual.
F.1 (8-01-86) Series Code 20	This interim revision restructured and revised Section 3.
PUB. NO. 49768900	Revision letters I, O, Q, S, X, and Z are not used.

c 1984, 85, 86, 87, 88  
By Laser Magnetic Storage  
International Company  
Printed in the United States  
of America

Address comments concerning this  
manual to:

Laser Magnetic Storage  
International Company  
Technical Publications Dept.  
2621 Van Buren Avenue  
Norristown, Pa. 19403

# REVISION RECORD

REVISION	DESCRIPTION
F.2 (09-26-86) Series Code 20	This interim revision incorporates Appendix A adding pages: A1 thru A5, iia, and affecting pages vii, viii, and ix.
G (11-21-86) Series Code 21	ECO PB 51938 has no effect on this manual.
H (03-20-87) Series Code 22 and above	This revision incorporates technical changes affecting pages: ii, iia, 3-39, 3-49. ECO PB 52101 has no effect on this manual.
H.1 (05-21-87) Series Code 22 and above	This revision includes editorial changes affecting pages: A-4 and A-5/A-6.
J (07-24-87) Series Code 27 and above	Series Codes 23 thru 26 are not used. This revision incorporates editorial changes affecting page iv.
K (12-18-87) Series Code 28 and above	This revision includes technical change affecting page: 3-10.
L (09-12-88) Series Code 28 and above	This revision incorporates ECO PB 52264C affecting pages: Cover, ii, iia/iib, iii, 1-9, 1-10, 3-17, 3-36, 3-39, 3-54.
PUB. NO. 49768900	Revision letters I, O, Q, S, X, and Z are not used.

## PREFACE

The purpose of this manual is to furnish the information needed to install, operate, and maintain the 92181 Streaming Tape Unit. Publication No. 49768900 is for on-site procedures and Publication Nos. 49769000 and 49769100 are for off-site activities. Their content is as follows:

- o Publication No. 49768900
  - Section 1 - General Description
  - Section 2 - Operation
  - Section 3 - Installation and Checkout
- o Publication No. 49769000 (Vertical Mounted STU)
  - Section 4 - Theory of Operation
  - Section 5 - Diagrams
  - Section 6 - Maintenance
  - Section 7 - Parts Identification
- o Publication No. 49769100 (Horizontal Mounted STU)
  - Section 4 - Theory of Operation
  - Section 5 - Diagrams
  - Section 6 - Maintenance
  - Section 7 - Parts Identification

<u>MODEL</u>	<u>DESCRIPTION</u>
BY3A6X	120V, 60 Hz, Vertical Mounting
BY3A6X	220/240V, 50 Hz, Vertical Mounting
BY3A7X	120V, 60 Hz, Horizontal Mounting
BY3A7X	220V, 50 Hz, Horizontal Mounting
BY3A9X	120V, 60 Hz, OEM Horizontal Cabinet
BY3A9X	220/240V, 50 Hz, OEM Horizontal Cabinet

The instructions for the operator Pub. No. 49768900 (Section 2) are written for a person with non-technical background. The remainder of Pub. No. 49768900 (Sections 1 and 3) is written for a person with technical background and experience with similar peripheral equipment.

It is assumed that any user of Pub. Nos. 49769000 or 49769100 is a qualified customer engineer with experience and/or training on similar peripheral equipment. The documents identified above are available through Laser Magnetic Storage International Company Tape Storage Division.

### WARNING

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A peripheral computing device pursuant to Subpart J of Part 15 of the FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case, the user, at his own expense, will be required to take whatever measures may be required to correct interference.

### NOTE

In the rear of this publication is a self-addressed folding envelope backed up by a comment sheet that should be utilized upon discovery of any discrepant information.

The revision level of each page is indicated by an alpha character located adjacent to the publication number at the bottom of each page. The revision level of a page will change when the content of the page has been affected by deletions or additions to the page. A bar in the margin indicates where the change has occurred. A dot near the page number indicates the entire page is affected, and a bar adjacent to the page number indicates pagination rather than content has changed.

## TABLE OF CONTENTS

	<u>PAGE</u>
Section 1 - GENERAL DESCRIPTION	
<u>GENERAL</u>	1-1
<u>PHYSICAL DESCRIPTION</u>	1-5
TAPE DECK - FRONT	1-5
Reel Motors	1-6
Air Bearings	1-6
Magnetic Head Assembly	1-6
Tape Cleaner	1-6
BOT/EOT Assembly	1-6
File Protect	1-7
Power Supply Circuit Breaker	1-7
Control Panel	1-7
Front Cover Interlock/Top Cover Interlock	1-7
Tape Deck Latch	1-7
TAPE DECK - REAR	1-7
Power Supply	1-8
Pneumatic Pump and Filter/Regulator System	1-8
Power Amplifier Board	1-8
Cooling Fan Assembly	1-9
Logic Cage	1-9
<u>EQUIPMENT CONFIGURATION</u>	1-9
EQUIPMENT ID PLATE	1-9
Equipment Identification Number	1-10
Series Code	1-10
Part Number	1-10
Serial Number	1-10
FIELD CHANGE ORDER LOG	1-11

## TABLE OF CONTENTS (Cont'd)

	<u>PAGE</u>
Section 2 - OPERATION	
<u>GENERAL</u>	2-1
<u>CONTROLS AND INDICATORS</u>	2-1
POWER SWITCH	2-1
COVER INTERLOCK	2-1
OPERATOR PANEL	2-1
<u>OPERATING INSTRUCTIONS</u>	2-3
TAPE THREADING AND LOADING	2-4
UNLOAD SEQUENCE	2-6
<u>OPERATOR CLEANING</u>	2-6
CLEANING PROCEDURES	2-6
Magnetic Head	2-8
EOT/BOT Assembly and Tape Cleaner	2-8
Air Bearings	2-8
Head Assembly Dust Covers	2-8
<u>REFLECTIVE TAPE MARKERS</u>	2-8
<u>EMERGENCY SHUTDOWN</u>	2-8
<u>OPERATOR DIAGNOSTICS</u>	2-9
REPORTING ERRORS	2-10
OPERATOR DIAGNOSTICS PROCEDURE	2-10
STU Status	2-11

## TABLE OF CONTENTS (Cont'd)

	<u>PAGE</u>
Section 3 - INSTALLATION AND CHECKOUT	
<u>GENERAL</u>	3-1
SITE REQUIREMENTS	3-1
Space and Clearance	3-1
Power	3-1
Grounding	3-1
UNPACKING/INSPECTION	3-3
Acceptance of Delivery	3-3
Unpacking Instructions	3-3
Acceptance of Unit After Unpacking	3-6
CHECKOUT PROCEDURE	3-6
Primary Power	3-6
Functional Checkout	3-7
TRANSPORT CONFIGURATION	3-10
Minimum System Configuration	3-11
Maximum System Configuration	3-11
ELECTRICAL/MECHANICAL INTERFACE	3-14
<u>VERTICAL MOUNTING PROCEDURE</u>	3-21
PACKAGING FOR RESHIPMENT	3-24
<u>HORIZONTAL MOUNTING PROCEDURE</u>	3-27
GENERAL DESCRIPTION	3-27
INSTALLATION KIT	3-29
<u>HORIZONTAL MOUNTING PROCEDURES</u>	3-31
<u>STU IN OEM CABINET</u>	3-35
UNPACKING INSTRUCTIONS	3-35
<u>PACKAGING INSTRUCTIONS</u>	3-40
APPENDIX A - Small Computer System Interface	A-1



## LIST OF FIGURES

<u>NO.</u>	<u>TITLE</u>	<u>PAGE</u>
1-1	Streaming Tape Transport	1-1
1-2	Component Locations, Front View	1-5
1-3	Component Locations, Rear View	1-8
1-4A	Equipment Identification Plate	1-9
1-4B	Equipment Identification Plate	1-
2-1	Operator Control Panel	2-1
2-2	Write Enable Ring	2-4
2-3	Tape Path	2-5
2-4	Component Cleaning Locations	2-7
2-5	Location of Reflective Tape Markers	2-9
3-1	STU Dimensions	3-4
3-2	STU Packaging	3-6
3-3	Installation Hardware - Rack	3-11
3-4	Installation Hardware - STU	3-12
3-5	Packaging For Reshipment	3-19
3-6	STU Packaging	3-25
3-7	Installation Hardware - Cabinet	3-29
3-8	Installation Hardware - STU	3-30
3-9	Interlock Switch Defeat Key	3-33
3-10	Packaging For Reshipment	3-38
3-11	Junction Box Assembly	3-41
3-12	In Cabinet STU Unpacking	3-43
3-13	Tape Deck Shipping Screws	3-45
3-14	Tape Deck Access	3-45
3-15	Tape Deck Shipping Material	3-46
3-16	Junction Box Wiring Diagram	3-49
3-17	Junction Box Grounding Terminals	3-50
3-18	STU Shipping Preparation	3-55
3-19	Jumper Plug and Switch Locations	3-59
3-20	Interface Configurations	3-60
3-21	Electrical Interface	3-62
3-22	I/O Connector Locations	3-62
3-23	Cable Jacket	3-63
3-24	Cables with Clamp Strip	3-63
3-25	I/O Ribbon Cable Installation	3-65
A-1	SCSI Interface PWA Switch Locations	A-4

## LIST OF TABLES

<u>NO.</u>	<u>TITLE</u>	<u>PAGE</u>
1-1	STU Characteristics	1-3
2-1	Controls and Indicators	2-2
2-2	Operator Corrective Action	2-12
3-1	STU Physical and Electrical Characteristics	3-2
3-2	Operator Corrective Action	3-16
3-3	STU Physical and Electrical Characteristics	3-22
3-4	Operator Corrective Action	3-35
3-5	STU Physical and Electrical Characteristics	3-40
3-6	Operator Corrective Action	3-53
3-7	STU Configuration	3-57
3-8	Connector Pin Configuration	3-66
A-1	Small Computer System Interface Options	A-1



## GENERAL

The Streaming Tape Unit (STU) is a microprocessor-based electronic and mechanical assembly that includes all hardware and firmware necessary for the transfer of Phase Encoded (PE) data to and from half-inch wide magnetic tape.

Solid-state electronics replace many devices that were traditionally mechanical. Tape moves from reel to reel, maintaining its tension with an electronically controlled servo. This non-buffered approach allows performance equivalent to that of a conventional capstan-controlled drive in the start/stop operating mode. The STU contains no capstan motor drive, tension arm, vacuum column or associated components. Read/Write functions are accomplished in an ECMA and ANSI compatible format at 1600 CPI Phase Encoding.

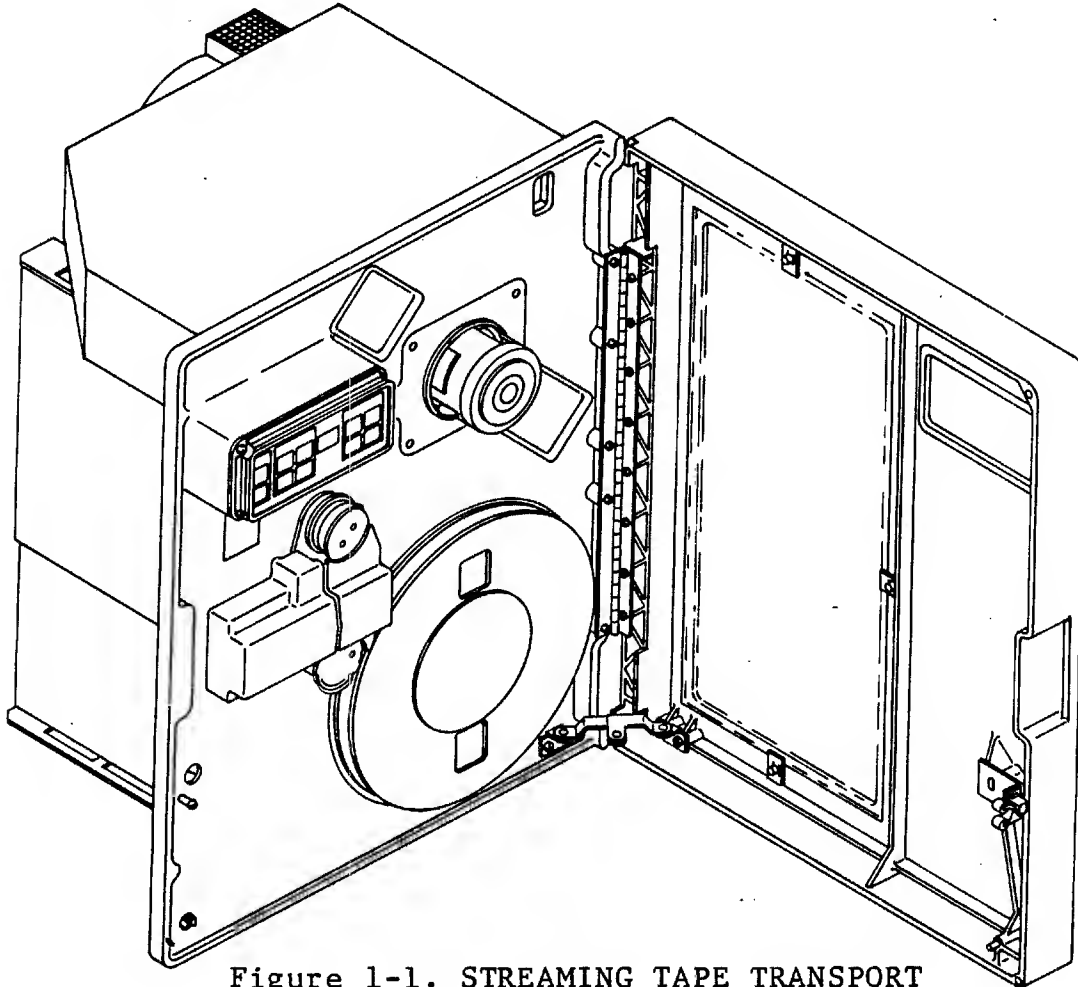


Figure 1-1. STREAMING TAPE TRANSPORT

The standard STU includes a tape deck with a read/write head, reel hubs, servo motors, power supply and air bearings. Printed circuit cards contain the following electronic features: servo power amplifier, read/write, reel servo control, data encoding and decoding, and two microprocessors with their support devices (for transport control in both the operational and diagnostic modes). The device features a quick-release reel latch which, like its simplified tape threading path, is designed for ease of operator actions.

The 92181 (25 IPS) unit has three operating modes: 25 ips start/stop, 25 ips streaming, and 100 ips streaming. Dual data transfer rate capability is achieved by allowing selection of the 25 ips modes and 100 ips mode through the adapter interface. The 25 ips modes operates at an instantaneous data rate of 40,000 bytes per second and the 100 ips mode at 160,000 bytes per second.

Selection of a normal Inter-block Gap (IBG) length of 0.6 inch or a long IBG length of 1.2 inches is also selectable through the interface. Optionally, selectable long and short gaps can be selected to be variable lengths.

Off-line diagnostics routines are designed into the transport and are capable of isolating faults throughout its electronics (except in the area of interface to the host I/O controller). These diagnostic routines are initiated via the operator's control panel and are explained in the Operation Section of this manual. On-line diagnostics are not possible with the transport, however, the host I/O controller is capable of monitoring the transport's status through the Sense Transfer command. In addition to the off-line routines initiated by the control panel, Power-On Health Checks are also an integral part of the STU. The STU automatically performs a "power-on health check" sequence of routines each time application of its power is applied.

Table 1-1 provides a list of mechanical and electrical characteristics for the STU.

Table 1-1. STU CHARACTERISTICS

Tape Width	12.649 + 0.051 mm (0.498 ± 0.002 inch)
Tape Thickness	38.1 microns (1.5 mils)
Tape Tension	2.23 N (8.0 oz)
Reel Diameter	26.67 cm (10.5 inches) Maximum *
Reel Capacity	2500 feet
Tape Speed	
Start/Stop	25 ips 92181
Streaming	25 ips and 100 ips
Data Transfer Rate (kilobytes/sec)	
Start/Stop Streaming - 25 ips	40
Streaming - 100 ips	160
Rewind Time	2.5 minutes (Nominal)
Beginning of Tape (BOT) and End of Tape (EOT) Detectors	Photo-electric
Recording Mode	9 Track, 1600 CPI PE
Weight	45.3 kg (100 pounds)
Dimensions	
Height	60.9 cm (24.0 inches)
Width	48.26 cm (19.0 inches)
Depth	38.6 cm (15.2 inches)
Operating Temperature	10°C (50°F) to 40°C (104°F)
Non-Operating Temperature (Storage)	-10°C (+14°F) to 50°C (122°F)
Relative Humidity (Operating)	20% to 80% (no condensation) with a maximum wet bulb temperature of 26°C (78°F)
Relative Humidity (Non-Operating)	10% to 90% (Storage), 5% to 95% (Transit)

Table 1-1. STU CHARACTERISTICS (Cont'd)

NOTE	
If the transport is operated outside the limits specified in ANSI Standard X3.40-76, degraded performance may occur on interchange with other tape systems operated within the environmental limits of the ANSI Specification.	
Altitude (Operating)	10,000 feet equivalent to a barometric pressure of 688 millibars (9.98 PSI)
Altitude (Transit)	10,000 feet equivalent to a barometric pressure of 688 millibars (9.98 PSI)
Power Voltage	120 VAC (104 minimum to 128 maximum) 60 HZ, single-phase, 2-wire plus ground  220 or 240 VAC (191 minimum to 256 maximum) 50 HZ, single-phase, 2-wire plus ground
Average Input Current	2.0 amps RMS (100 IPS Streaming)
Average Continuous Power	170 watts RMS Low Speed, 220 watts RMS High Speed
Mounting	Vertical or Horizontal
Electronics	Solid-State

\* The STU is capable of accepting 6.25, 7.0, 8.5, and 10.5 inch reel diameters which meet ANSI requirements.

## PHYSICAL DESCRIPTION

The STU is designed to be hinge-mounted in a standard 19-inch equipment rack in the vertical position or adapted to a horizontal mount. It is also available in a cabinet with horizontal orientation. All components are mounted to provide rear access. When the equipment rack or enclosure is securely anchored, the assemblies mounted on the rear of the tape deck can be accessed by releasing the deck latch and swinging the transport open on its hinges (vertical), or rotating transport deck (horizontal).

A plastic hinged front cover (vertical) or top cover (horizontal) protects the transport from dust and other foreign matter. A transparent window in the cover allows observation of tape motion. Also, the control panel mounted on the front tape deck is accessed via a cut-out in the front cover or on the front of the horizontal cabinet. The power cord (standard 3-prong grounded plug) is connected at the rear of the transport, as are the customer-supplied interface cables.

### TAPE DECK - FRONT

Refer to Figure 1-2 for component locations. The following components are located on the front of the transport. A brief description of the components and their function is provided as follows.

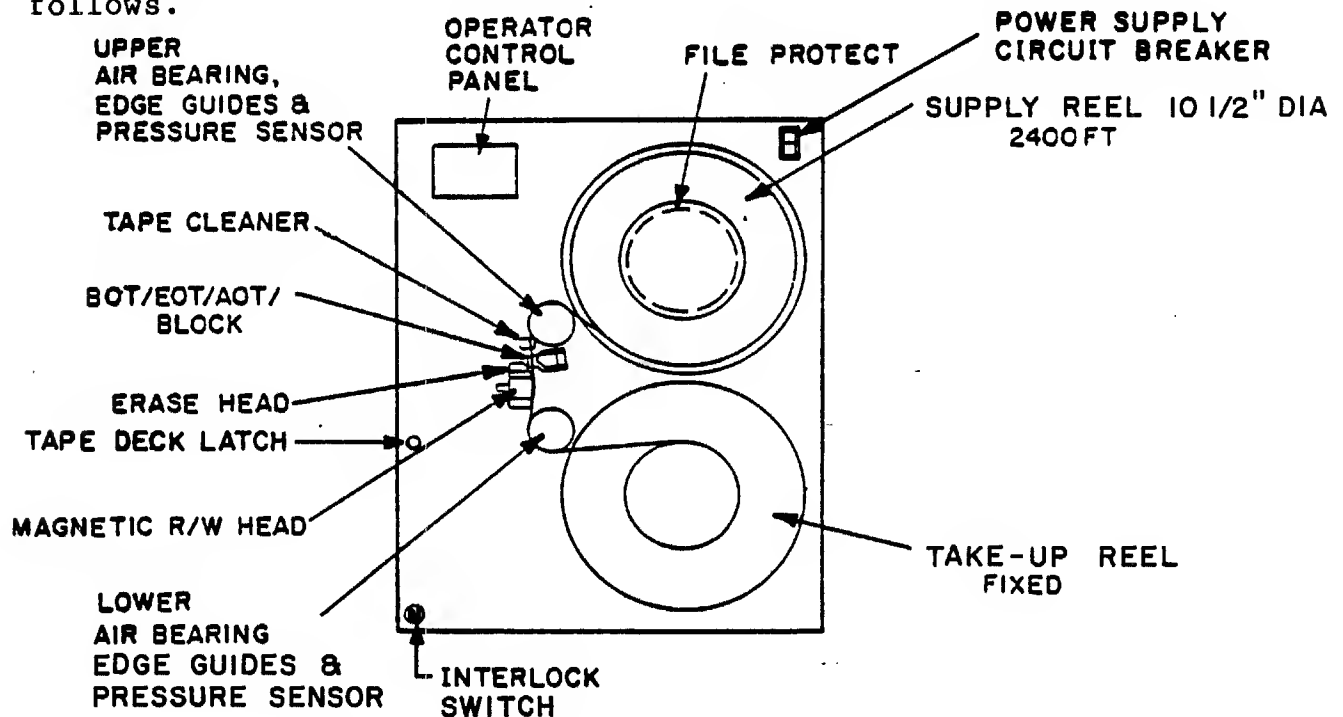


Figure 1-2. COMPONENT LOCATIONS, FRONT VIEW



## Reel Motors

The reel motors are conventional, permanent-magnet DC motors. The supply reel (upper) hub is a manual, mechanical latching device that secures the tape reel to the supply hub. The reel is latched by pressing the periphery of the hub face while the reel is positioned against the rear flange of the hub. It is released by pressing the center button of the hub face.

The supply reel motor works in conjunction with the upper and lower air bearings to control tape tension across the recording surface of the magnetic head. The air bearings sense the proximity of tape via air pressure and, in effect, activate the transducers. The transducers cause the servo to maintain a constant tension by action of the supply reel motor. The take-up (lower) reel is a permanently mounted reel secured to the take-up motor shaft. The take-up reel motor has a 1000 segment tachometer attached which provides velocity control.

## Air Bearings

In addition to the tension monitor function explained in the above paragraph, the air bearings also provide guidance of the tape across the magnetic head.

## Magnetic Head Assembly

The magnetic head is a dual-gap read/write unit designed to perform the read/write functions in a 9 track PE mode. The dual-gap head allows a write-to-tape operation, read-only operation or read-after-write operation. A full-width erase head is also provided to erase the tape by DC saturation in the forward direction before passing over the write head.

## Tape Cleaner

The tape cleaner assembly consists of two blades and a vacuum port to attract tape to the cleaner surfaces. The cleaners are designed so that one cleaner cleans tape in the forward direction and the second cleans tape in reverse direction. The vacuum system directs the stripped particles through a screen and into a filter.

## BOT/EOT Assembly

Load Point/End of Tape is detected optically. Photo-transistors detect light reflected from BOT and EOT markers on tape. A no-tape-present condition is detected when both BOT and EOT photo-transistors detect a reflective marker normally blocked by the presence of tape.

### File Protect

The file protect assembly consists of a 360° reflecting ring around the supply hub and a photo-transistor mounted adjacent to the reflecting ring. If a write enable ring is installed in the supply reel, the reflecting ring is in direct line with the photo-transistor. If a write enable ring is not present, then the reflecting ring is out of the path of the photo-transistor.

### Power Supply Circuit Breaker

The main circuit breaker is located at the top right corner of the tape deck. In the OFF position (0 side depressed), input power is removed from the power supply. This circuit breaker must be ON (1 side depressed) in order to perform a power-on operation from the control panel.

### Control Panel

The control panel includes a set of operational control switches, indicators, and a display located at the top left (vertical mount) of the tape deck. These controls enable the operator to initiate and monitor results of off-line diagnostic routines. In horizontal mount configurations, the panel is located in the front door of the cabinet.

### Front Cover Interlock

The transport is equipped with an interlock switch/front cover latch located at the lower left corner of the tape deck. This interlock is basically a safety device to prevent reel motion, unless the front cover is closed and secured.

### Tape Deck Latch

This latch enables access to the components and interface cables located on the rear of the tape deck.

### TAPE DECK - REAR

Refer to Figure 1-3 for component locations in the vertical orientation. The following components are located on the rear of the transport. A brief description of the components and their function is provided as follows.

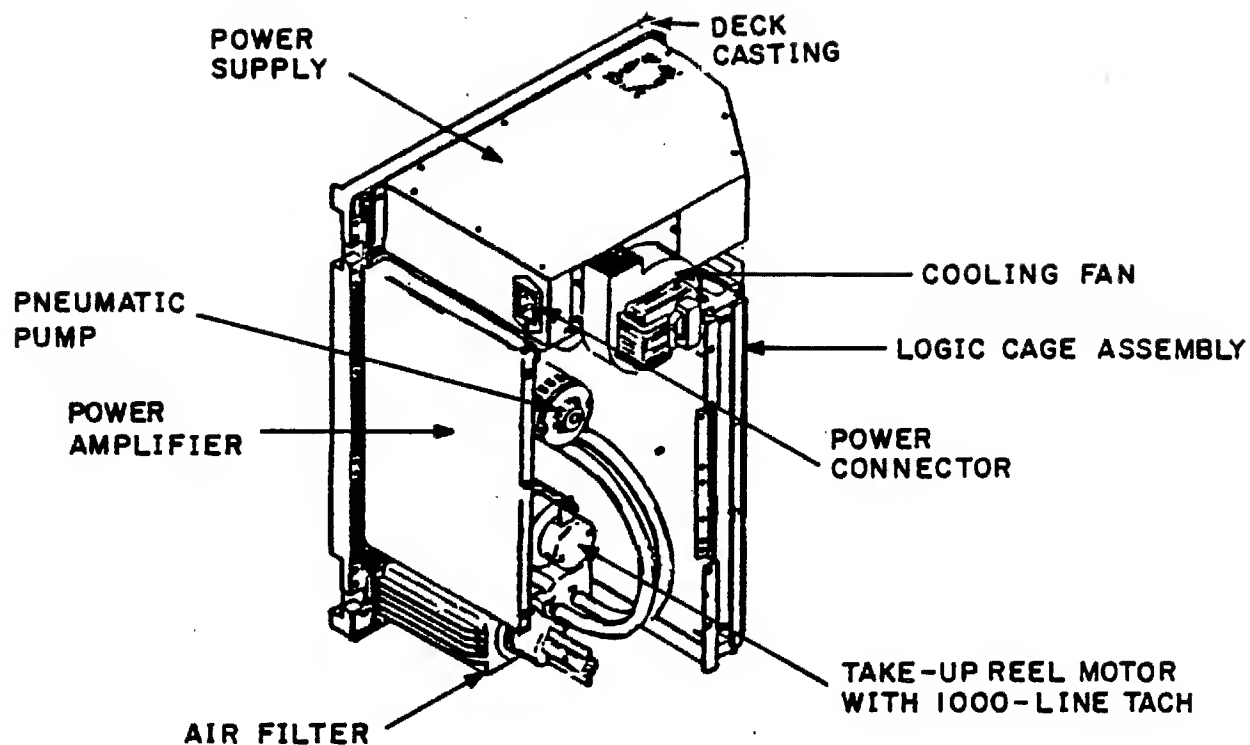


Figure 1-3. COMPONENT LOCATIONS, REAR VIEW

### Power Supply

The power supply accepts the input AC voltage and converts it to six (+5, -6, +15, -15, +25.5, +38) DC output voltages. The supply contains a line filter, unit circuit protectors, on/off circuit breaker, logic master clear circuit, pneumatic pump motor control, cooling blower control, and voltage and current monitors.

### Pneumatic Pump and Filter/Regulator System

The pneumatic pump has a 120V (60 HZ) or 220/240V (50 HZ) AC motor. The output air is routed to a filter where any particles are removed before distribution to tape deck components; principally the upper and lower air bearings. The vacuum portion of the pump draws air from the tape cleaner.

### Power Amplifier Board

The power amplifier board receives the low voltage analog signals from the control logic and outputs a higher voltage, high current to the reel motors. Outputs are dependent on the requirements of the velocity and tension servo systems.

## Cooling Fan Assembly

The cooling fan is a squirrel-cage type assembly located at the rear of the power supply. Cooling air is drawn across the rear deck assemblies and through the power supply. The fan motor is compatible with either 120 or 240 volt operation.

## Logic Cage

The logic cage contains the power connector into which the various PC boards are inserted. The two PC boards that reside in the logic cage are the Formatter Control board and Read/Write Servo board.

## EQUIPMENT CONFIGURATION

The equipment configuration of the transport is determined by the equipment identification plate plus the Equipment Configuration log that must be present with every transport. A description of the ID plate and the Equipment Configuration log is given in the following paragraphs.

## Equipment ID Plate Location

1. The vertical rack mounted STU has the ID plate located on the inside lower right bottom of the front door or on the power amp bracket.

**GD COMPUTER PERIPHERALS, INC.**  
a Control Data Company

**MORRISTOWN, PA.** **MADE IN USA**

THIS MACHINE WIRED FOR:  
CETTE UNITE A UNE TENSION NOMINALE DE:  
DIESES GERÄT ARBEITET MIT EINEM STROM VON:  
ESTE EQUIPO FUNCIONA CON CORRIENTE DE:

EQUIP IDENT NO.	SERIES CODE	PART NUMBER	SERIAL NUMBER
V~	HZ	PH	A/PH
			W
EQUIPMENT CABINET IDENT			

PA 77-18023

OR

**LAKEH MANUFACTURING STORAGE  
INTERNATIONAL COMPANY**  
CPI DIVISION

**MORRISTOWN, PA.** **MADE IN USA**

THIS MACHINE WIRED FOR:  
CETTE UNITE A UNE TENSION NOMINALE DE:  
DIESES GERÄT ARBEITET MIT EINEM STROM VON:  
ESTE EQUIPO FUNCIONA CON CORRIENTE DE:

EQUIP IDENT NO.	SERIES CODE	PART NUMBER	SERIAL NUMBER
V~	HZ	PH	A/PH
			W
EQUIPMENT IDENT			

PA 77-18022

Figure 1-4A. Equipment Identification Plate

2. The horizontal cabinet mounted STU has the ID plate located on the inside upper left side of the cabinet or on the cross-member inside front door.

COMPUTER PERIPHERALS, INC.  
a Control Data Company

ROBSTOWN, PA. MADE IN USA

THIS MACHINE WIRED FOR:  
CETTE UNITE A UNE TENSION NOMINALE DE:  
DIESES GERÄT ARBEITET MIT EINEM STROM VON:  
ESTE EQUIPO FUNCIONA CON CORRIENTE DE:

EQUIP IDENT. NO.	SERIES CODE	PART NUMBER	SERIAL NUMBER
V/Hz	Hz	Ph	A/Ph

EQUIPMENT/CABINET IDENT

P/N 77042892

OR

LASER MAGNETIC STORAGE  
INTERNATIONAL COMPANY  
CPI DIVISION

MADE IN USA

THIS MACHINE WIRED FOR:  
CETTE UNITE A UNE TENSION NOMINALE DE:  
DIESES GERÄT ARBEITET MIT EINEM STROM VON:  
ESTE EQUIPO FUNCIONA CON CORRIENTE DE:

EQUIP IDENT. NO.	SERIES CODE	PART NUMBER	SERIAL NUMBER
V/Hz	Hz	Ph	A/Ph

EQUIPMENT IDENT

P/N 77050320

Figure 1-4B. Equipment Identification Plate

Refer to Figures 1-4A and 1-4B for the following items contained on the ID plate.

### Equipment Identification Number

The BY3 identifies the basic function and major design characteristics of the transport. For this application, BY3 indicates a transport with formatter designed for the streaming mode. The fourth and fifth digit of the identification number is a control number used to identify specific features of the basic model. The sixth digit identifies 60 Hz or 50 Hz operation.

### Series Code

This alpha-numeric character is suffixed to the equipment identification number and the manufacturing level of the transport. The basic function and operability of the transport remains the same throughout all series codes, however, engineering changes, which occur during the course of production, are controlled by the series number.

### Part Number

This is the top level assembly number of the transport.

### Serial Number

Each transport has a unique serial number that is assigned sequentially by the manufacturer. No two transports within a family of products will have the same serial number.

### V

Indicates the input voltage requirement of the transport.

### Hz

Indicates the cycles per second requirement associated with the input voltage.

### Ph

Indicates the phase requirement of the transport.

### A/Ph

Indicates the maximum ampere requirements per phase.

### W

Indicates the total power consumption of the transport.

### Wire

Indicates configuration of the input line cord.

## EQUIPMENT CONFIGURATION LOG

A Field Change Order is a change to the transport after it has been shipped from the manufacturing facility. It is important that the equipment configuration log is kept current by the person installing the FCO, so that the exact configuration of the transport can be referenced.



## GENERAL

This section of the manual explains the control panel, cleaning procedures and service routines associated with the Streaming Tape Unit. A thorough understanding of the control panel functions and cleaning procedures will ensure optimum operating efficiency. In the event of failure, the service routines will enable the operator to accurately report the type of failure to the customer engineer.

## CONTROLS AND INDICATORS

### POWER SWITCH

The main power switch (circuit breaker) is located at the upper right corner of the tape deck. In the OFF position (0 side pressed), input AC voltage is removed from the STU power supply. In the ON position (1 side pressed), the transport is powered on.

### COVER INTERLOCK

The interlock switch/cover latch is a safety device that allows reel motion only when the top cover is closed and latched.

### OPERATOR CONTROLS

Figure 2-1 shows the STU control panel switches and indicators. All switches on the panel are membrane switches. Switch functions and the conditions required for enabling the corresponding functions are given in Table 2-1.

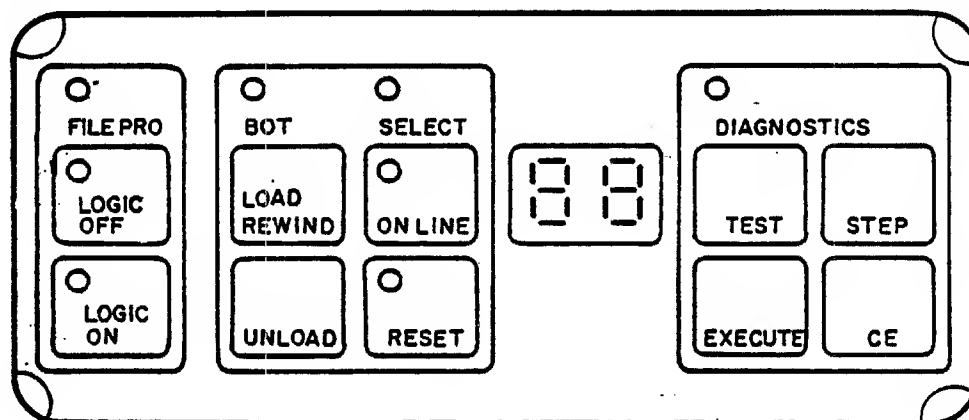


Figure 2-1. OPERATOR CONTROL PANEL



Table 2-1. CONTROLS AND INDICATORS

SWITCH/INDICATOR	FUNCTION
LOGIC OFF	<p>Indicator - When illuminated, indicates a standby power condition exists (power circuit breaker ON - STU power OFF). If indicator is extinguished with no other indicators illuminated, then power circuit breaker is OFF or power cord is not connected. If indicator is extinguished and LOGIC ON indicator is illuminated, the STU is in the power-on condition.</p> <p>Switch - If pressed when STU is powered on, power will be removed from STU and LOGIC OFF will illuminate.</p>
LOGIC ON	<p>Indicator - Illuminated indicates STU is powered on.</p> <p>Switch - If pressed, when LOGIC OFF indicator is illuminated, the STU will power-on.</p>
FILE PRO	<p>Indicator - Illuminated after tape is loaded indicates absence of a write enable ring in supply reel. Read-Only operations are enabled. Indicator extinguished indicates write operations are permitted.</p>
BOT	<p>Indicator - Illuminated after tape is loaded indicates tape is positioned at beginning of tape reflective marker.</p>
LOAD/REWIND	<p>Switch - If STU is powered on, and tape is threaded but not loaded, pressing switch causes load operation to be performed. If tape is loaded and not positioned at BOT marker, pressing switch causes unit to rewind to BOT.</p>
UNLOAD	<p>Switch - If tape is loaded and positioned at BOT, pressing switch causes tape to unload from take-up reel and tape path onto supply reel. If tape is loaded and not at BOT, unit will rewind to BOT and then unload. If tape is threaded, but not loaded, a slow tape removal operation will be performed.</p>

Table 2-1. CONTROLS AND INDICATORS (Cont'd)

SWITCH/INDICATOR	FUNCTION
SELECT	Indicator - Illuminated when channel addresses subsystem, and the formatter and transport address lines FFAD, FTAD0, and FTAD1 correspond with unit address selected on Formatter/ Control PWA. NOTE: False = Logic High.
ON-LINE	Indicator/Switch - When STU is on and tape loaded, pressing switch makes transport available to operating system. Indicator will illuminate. When on-line, all switches except RESET and LOGIC OFF are inhibited. RESET removes ON-LINE status and extinguishes indicator.
RESET	Indicator - If illuminated, indicates that the 2-digit display contains a fault code or diagnostic termination code. Switch must be pressed to clear fault latch. LOAD is then pressed to restore LOAD condition.  Switch - Used to reset a fault or diagnostic termination condition. Also used to place transport in an OFF-LINE condition, or terminate LOAD or REWIND operations.
DIGITAL INDICATOR	Digital readout indicates test number selected when in the diagnostic mode, or fault code number for an abnormal operation.
DIAGNOSTIC SWITCHES: TEST-STEP-EXECUTE-CE	Control switches for diagnostic test selection. Operators refer to OPERATOR DIAGNOSTICS in this section of the manual. Maintenance personnel refer to MAINTENANCE section of the Field Service Manual.

### OPERATING INSTRUCTIONS

Before mounting the reel of tape onto the supply hub, determine whether or not the tape is to be recorded (write operation performed). If write operations are to be performed, place a write enable ring into the rear recessed portion of the reel. Refer to Figure 2-2. When the reel is prepared, proceed with the load sequence as follows.

## TAPE THREADING AND LOADING

1. Open dust cover door, place circuit breaker to ON position (1 depressed). LOGIC OFF indicator should illuminate.
2. Press LOGIC ON switch. LOGIC OFF indicator extinguishes and LOGIC ON, FILE PRO and SELECT indicators should illuminate.

### NOTES

- a. If a Fault Code appears on the display, press RESET and LOGIC OFF keys to clear display. Then press LOGIC ON again to repeat Power-On Health Check. If Fault Code reappears, refer to the applicable Field Service Manual (Trouble Analysis section) to isolate the failure.
  - b. If unit is already powered on, proceed to step 3.
3. Press inner button on face of supply reel hub.
  4. Mount supply reel onto hub so that reel is against rear flange. Secure reel by pressing periphery of hub face to latch reel.

### NOTE

Position hands on reel so they are aligned with recesses in deck (11 o'clock and 5 o'clock).

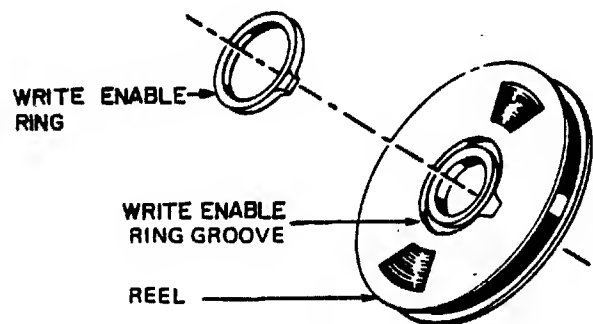


Figure 2-2. WRITE ENABLE RING

5. Thread magnetic tape over tape path as shown in Figure 2-3.
6. Wrap tape leader onto take-up reel for several turns.

CAUTION

Ensure tape is positioned correctly over all tape path components, otherwise, tape damage may occur.

7. Close dust cover door and press LOAD/REWIND switch. Pneumatics pump motor starts and, after one second delay, forward motion is established. Motion stops when beginning of tape (BOT) reflective marker is detected. If BOT marker was positioned after sensor, when tape was threaded, then forward motion would continue for approximately 40 feet. The transport then initiates reverse motion until reflective marker is detected. Motion stops and BOT indicator is illuminated.
8. Depress ON-LINE switch to place unit on-line. The ON-LINE switch may be pressed while load operation is in progress. On completion of load operation, the STU will indicate an ON-LINE status.

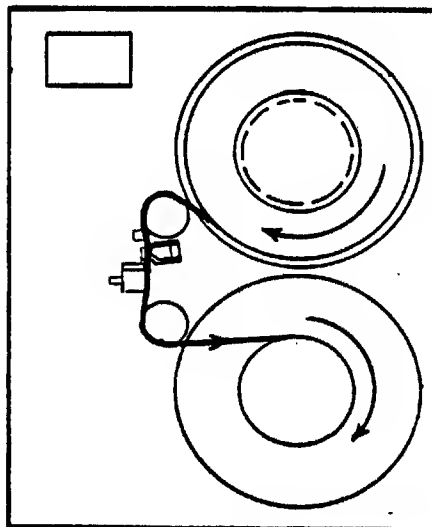


Figure 2-3. TAPE PATH

## UNLOAD SEQUENCE

1. Press RESET switch to place transport off-line.
2. Press UNLOAD switch. Tape moves in reverse direction until tape leaves take-up reel and tape path component areas.
3. Open dust cover and press center button face of supply reel hub. Hub will unlatch and supply reel can be removed.

### NOTE

Position hands on reel so they are aligned with recesses in deck (11 o'clock and 5 o'clock).

4. Close dust cover door to prevent dust accumulation on tape deck components.

## OPERATOR CLEANING

The STU is designed to provide a high degree of reliability to the user while minimizing the maintenance requirements.

The high reliability, low maintenance feature however, is entirely dependent on the proper care and handling of the transport and magnetic tape. The cleaning procedures outlined in the following paragraphs are brief and require only minutes of the operator's time, but cleaning must be done as explained, in order to achieve continued reliability and low maintenance.

## CLEANING PROCEDURES

Cleaning of the transport should be performed on a regularly scheduled basis. Areas that require operator cleaning are as follows:

1. Clean magnetic head, EOT/BOT sensor, supply reel hub pads, tape cleaner, and air bearings after every eight-hours of operation.
2. Clean housing, front of tape deck and dust cover (front door) as required.

### CAUTION

Do Not use solvent in a confined or poorly ventilated area. Avoid prolonged breathing of vapor and contact with skin or clothing. Use disposable gloves (P/N 95962550) to avoid prolonged contact with skin. Adhere to any other precautions on cleaning solvent container.

Cleaning materials recommended to perform maintenance are as follows:

- o Solvent P/N 95054701
- o Foam Swabs P/N 12218463
- o Lint-Free Cloth P/N 94211400

To access components, remove the two-part head assembly dust cover from tape deck.

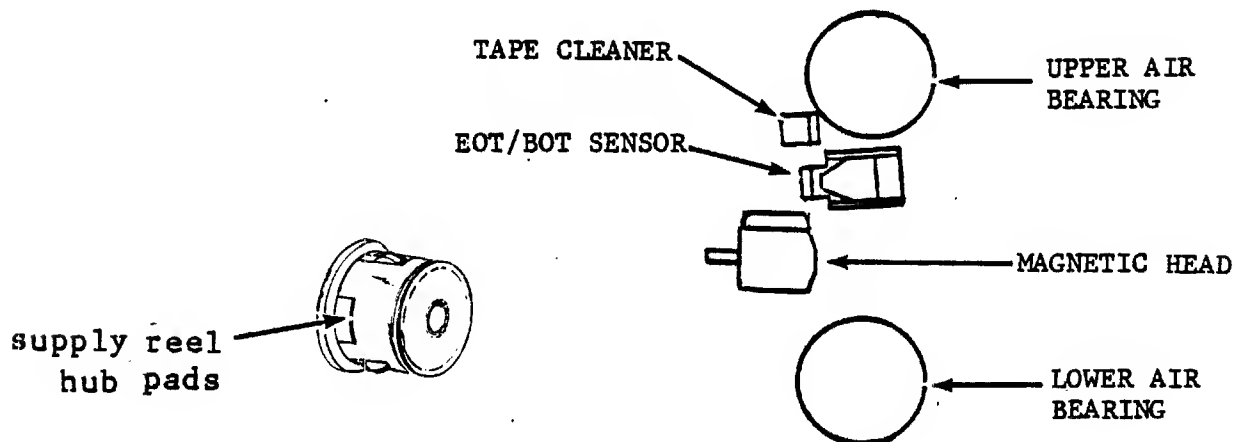


Figure 2-4. COMPONENT CLEANING LOCATIONS

### Magnetic Head

Clean head recording surface with a soft lint-free cloth moistened with solvent. Wipe recording surface in the same direction that tape moves across the head.

### EOT/BOT Assembly and Tape Cleaner

Use a foam swab moistened with solvent to remove dirt or oxide from sensor surfaces and reflective strip, and from tape cleaner blades.

### Air Bearings (Upper and Lower)

Clean both air bearings with a soft lint-free cloth moistened with solvent. Do Not soak cloth with solvent. Ensure foil area, guide springs and both tape guides are cleared of any oxide/dirt build-up. If available, use a small mirror to inspect inner edge of guides.

### Head Assembly Dust Covers

To prevent the transfer of dirt to tape components, Do Not allow an accumulation of dust or dirt to reside on the inside of the dust cover.

### Supply Reel Hub Pads

Clean the three hub pads with a clean cloth moistened with solvent. Do not soak with solvent.

### REFLECTIVE TAPE MARKERS

Every reel of magnetic tape must have a BOT (beginning of tape) and an EOT (end of tape) reflective marker, so that the transport can recognize starting and stopping areas. Tapes are always supplied with reflective markers installed, however, if the markers become detached for any reason or, if a tape leader is shortened because of tape damage, then the operator must install the markers in the manner shown in Figure 2-5.

### EMERGENCY SHUTDOWN

To isolate the transport from the power line, remove power at the mains disconnect.

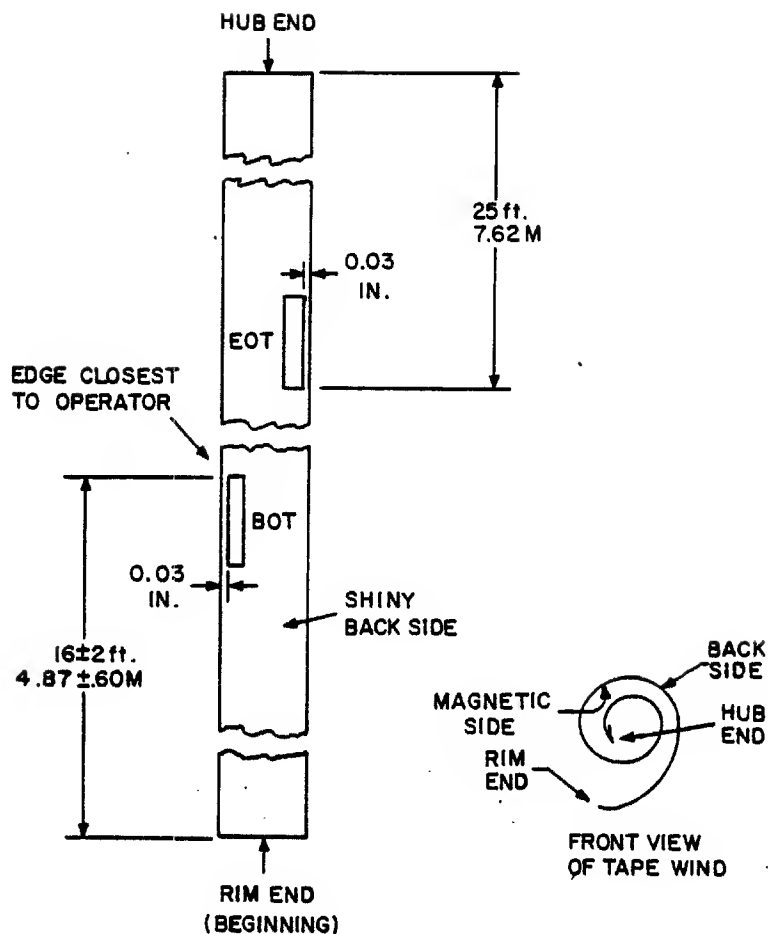


Figure 2-5. LOCATION OF REFLECTIVE TAPE MARKERS

### OPERATOR DIAGNOSTICS

Operator diagnostics are designed to allow the operator to initiate a functional test in order to verify the performance of the transport. The operator diagnostics should normally be initiated in the event of a failure.



## REPORTING ERRORS

Faults detected in the STU are reported to the operating system via status lines and sense bytes which describe the operating status of the STU. When the STU is operating on-line to the operating system, the operator may be made aware of any abnormal condition by the operating system (either by a CRT display or output printer). These fault reports should be retained or logged by the operator so that maintenance personnel can determine not only the type of fault, but also the circumstances under which the fault occurred.

If the faults are such that the STU takes itself off-line, then the operator is informed of the fault by illumination of RESET indicator and display of the fault code on the 2-digit display. For a breakdown of fault codes and probable causes, refer to the Operator Corrective Action Table in this section of the manual.

There are certain situations in which the operator can take action to correct a reported problem prior to running the operator diagnostics. Read or Write (Data) errors are a prime example. Data errors are very often caused by dirt accumulation in the tape path area (magnetic head, air bearings, tape cleaner) or by a defective reel of tape. If Data errors are reported, clean the tape path area as described in the OPERATOR CLEANING section of this manual. During cleaning, take the time to inspect the tape path components for defects; e.g., tape cleaner blades damaged, reel flanges cracked or misaligned causing contact with tape edges, etc. Both cleaning and inspection of components take only minutes, but go a long way toward maintaining the reliability of the transport and minimizing down-time.

If cleaning does not resolve the problem, then replace the reel of tape with a tape of known good quality. After the above procedures are performed, then the only recourse is to report the fault to maintenance personnel.

## OPERATOR DIAGNOSTICS PROCEDURE

The operator diagnostics consist of one selectable test which runs for approximately 10 minutes, if a 10.5 inch tape reel is used. Optional tests are available, and should be run only if maintenance personnel request the operator to initiate these tests. Faults encountered during the test will stop the test and display a numerical code on the display panel. Any fault code should be logged by the operator and given to maintenance personnel when the problem is reported.

In order to eliminate the possibility of false displays due to a malfunctioning display panel, the first portion of the operator diagnostic is an exercise of the display panel indicators. At this time, the numerical display will increment from 00 thru 99. Concurrent with the numerical display, the following indicators will be illuminated: FILE PRO, LOGIC ON, ON-LINE, RESET and DIAGNOSTICS. Initiate the operator diagnostics as follows:

STU Status - Test 01

1. Place circuit breaker on and depress LOGIC ON (LOGIC ON indicator illuminated). If a fault occurs at this time, do not attempt further testing; report error code to maintenance personnel.
2. Tape threaded through tape path and onto take-up reel, but NOT loaded.
3. Close front door.

o Test Procedure

1. Press TEST switch on diagnostic portion of operator panel.
  - a. DIAGNOSTICS indicator illuminates.
  - b. 01 is indicated on display panel.
2. Press EXECUTE switch.
  - a. Test commences with display panel incrementing from 00, 11, 22 thru 99. Verify that all segments of numerical display are functioning.
  - b. Concurrent with step a. above, verify that all indicators except LOGIC OFF, BOT and SELECT are illuminated.
  - c. Test continues with various motion and read/write exercises for approximately 10 minutes (2400 feet of tape).

o Test Successful

1. If test runs to completion, the STU performs a REWIND/UNLOAD operation and 00 is indicated on display panel, with RESET indicator illuminated.

o Test Unsuccessful

1. If test is unsuccessful, the diagnostic halts and numerical code appears on display, with RESET indicator illuminated. Record this number.
2. Refer to Operators Corrective Action Table for operator action that may resolve fault without maintenance personnel involvement.

Reinitiate Test 01 after performing any of the above actions. If test is successful, return STU to normal operation. If fault is not resolved, proceed with step 3.

3. Report number recorded in step 1. and any different numbers to maintenance personnel.

Table 2-2. OPERATOR CORRECTIVE ACTION

FAULT CODE	CORRECTIVE ACTION
01 thru 09	Clean magnetic head and tape path per instructions in OPERATOR CLEANING section of this manual.
10	Ensure front door is securely closed.
11	Thread tape.
12	Indicates supply reel hub is not latched, BOT marker is located incorrectly, or a tension fault occurred during a load operation.
13	Refer to tape threading diagram on tape deck to ensure tape is threaded correctly.
14	Check for BOT marker on tape. Refer to Figure 2-5.
15	Indicates RESET switch pressed inadvertently by operator. Reinitiate test.
16	Check for presence of write enable ring in rear of supply reel. Install ring if not present.

Table 2-2. OPERATOR CORRECTIVE ACTION (Cont'd)

FAULT CODE	CORRECTIVE ACTION
17	Check for presence of EOT marker.
18	Indicates tape loaded when test was initiated. Thread tape, but do not press LOAD switch.
20 thru 29	Mount a tape of known good quality.
All Others	Report fault code to maintenance personnel per procedure discussed in previous paragraphs.

In certain instances, maintenance personnel may request the operator to initiate Diagnostic Tests 02 or 03. If such a request is made, proceed as follows:

NOTE

Tests 02 and 03 cannot be used unless Test 01 directs their use. These tests may fail, if run alone.

STU Status - Test 02/Test 03

1. STU powered on.
2. Tape threaded, but NOT loaded for Test 02. Tape should NOT be threaded for Test 03.
3. For Test 02: fault code from Test 01 is displayed on 2-digit display.
4. Front door closed.

o Test Procedure

1. Press RESET switch (resets fault code from Test 01, if still indicated).
2. Press TEST switch.
  - a. DIAGNOSTICS indicator illuminates.
  - b. 01 is indicated on display.

3. Press STEP switch one time.
  - a. Numerical display steps from 01 to 02.
  - b. If Test 03 is requested, press STEP again to increment from 02 to 03.
4. Press EXECUTE switch.
  - a. Test commences; test runs less than one minute.

o Test Terminates

1. The diagnostic halts and a numerical code appears on display and RESET indicator is illuminated. Record this number and report fault to maintenance personnel.

NOTE

Test 01 is required to precondition the unit for Test 02. If Test 02 is attempted without first getting Test 01 fault code directing Test 02 be run, unit will display Termination Code 70 - Invalid Operator Sequence.

---

## GENERAL DESCRIPTION

The STU you receive will be one of the following configurations, and the installation instructions are presented in the following sequence:

- o Vertical Mount STU
- o Horizontal Mount STU Without Cabinet
- o Horizontal Mount STU In Cabinet
  - Physical and Electrical Characteristics
  - Site Requirements
  - Unpacking and Inspection
  - How To Mount The STU (where applicable)
  - Functional Checkout
  - Packaging For Reshipment

Information common to all three STUs is supplied under the following headings:

- o How To Configure The STU
- o Electrical Interface
- o How To Install The I/O Cable

## VERTICAL MOUNT STU

### PHYSICAL AND ELECTRICAL CHARACTERISTICS

The STU physical and electrical characteristics are listed in table 3-1.

Table 3-1. STU PHYSICAL AND ELECTRICAL CHARACTERISTICS

Weight	59.87 kg (117 pounds) packaged 49.90 kg (110 pounds) in frame
Dimensions	
Height	60.9 cm (24.0 inches)
Width	48.26 cm (19.0 inches)
Depth Overall	44.45 cm (17.55 inches)
Depth From Mounting Surface	34.56 cm (13.61 inches)
Operating Temperature	15°C (60°F) to 33°C (90°F)
Non-Operating Temperature (Storage)	-10°C (14°F) to 50°C (+122°F)
Relative Humidity (Operating)	20% to 80% (no condensation) with maximum wet bulb temperature of 26°C (79°F)
Relative Humidity (Non-Operating)	10% to 90% (storage) 5% to 95% (transit)
Altitude (Operating)	Up to 3048m (10,000 ft) equivalent to a barometric pressure of 688 millibars
Altitude (Non-Operating)	Up to 3048m (10,000 ft) equivalent to a barometric pressure of 688 millibars
Power	
Voltage	120V (93 min. to 128 max.) 60 Hz, single phase, 2-wire plus ground  220 or 240V (187 min. to 256 max.) 50 Hz, single phase, 2-wire plus ground
Average Input Current	120V - 3.0 amps RMS 220-240V - 1.5 amps RMS
Average Continuous Power	300 VA - standby and loaded 550 VA maximum - start/stop
Mounting	Standard EIA rack 19-inch vertical mounting

## SITE REQUIREMENTS

### Space and Clearance

Allowance must be made for maintenance and operator access. There should be sufficient space, to the left and front of the STU, to allow full opening of the STU on its mounted hinges. Maintenance or operator access requirements are shown in Figure 3-1. The user must consider the safety and electro-magnetic interference ramifications and cooling requirements in designing the transport enclosure, signal cables, and power cables of the subsystem. Such consideration may require that fewer than four STU's be mounted in a specific cabinet design.

### Power

The input power requirements for the STU are 120 VAC (60 Hz) or 220 VAC (50 Hz), single phase, 2-wire, plus ground with shielded power cord. The input power cord is supplied as part of the installation kit for 60 Hz units. The input power connector is supplied in the installation kit for 50 Hz units. Refer to the accompanying table for voltage tolerances and current/power characteristics.

### Grounding

Earth ground is obtained via the power cord. An EMC ground is provided by system-grounding the shielded jackets of the I/O cables. Logic ground referencing is via the interface connector. A single-point grounding scheme is used to connect logic ground to frame/earth ground.

## UNPACKING/INSPECTION

### Acceptance of Delivery

Carefully inspect the shipping container on all sides, including top and bottom, for severe gouges, cuts, abrasive tears, or badly smashed corners or edges. This constitutes mishandling in shipment and the unit may have been damaged. If there is any evidence of damage to the shipping container, it should be recorded and signed by the carrier's representative, acknowledging the damage before accepting delivery.



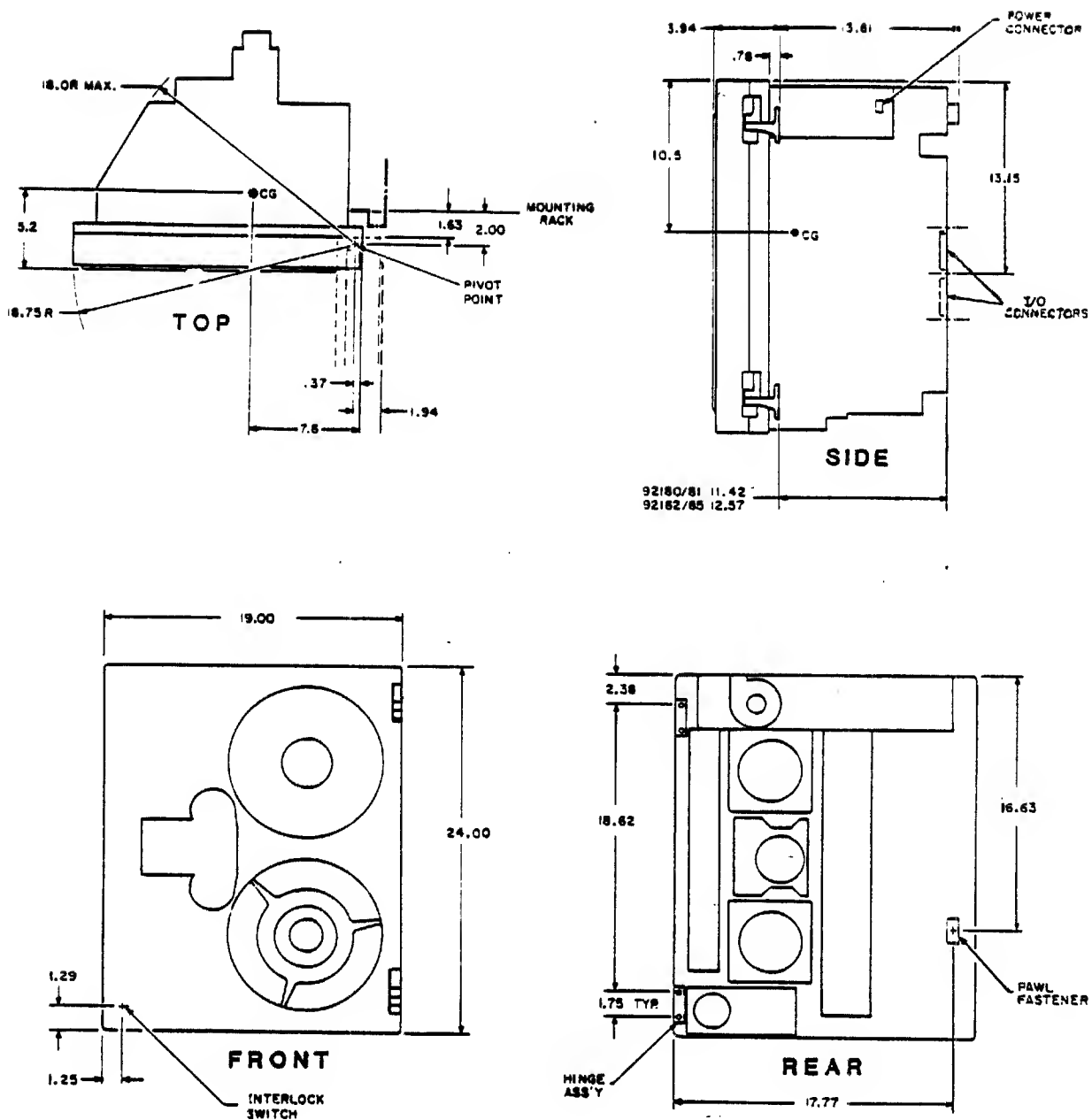


Figure 3-1. STU DIMENSIONS

## Unpacking Instructions

Each STU is packed in a 500-pound tested, double-wall corrugated container, 23 inches by 24-1/2 inches by 31-1/2 inches high, with inner protective packaging as shown in Figure 3-2. The STU should be unpacked in the area or room where it will be installed and, because of the weight (approximately 117 pounds packaged), requires two people. Perform the unpacking as follows:

### CAUTION

When performing step 1, use a utility knife or other short-blade instrument to ensure that STU is not scratched or marred.

1. Place carton with arrows pointing up. Cut reinforcing tape at top of carton (three places) and fold four carton flaps back.
2. Remove STU and all protective packaging as follows: (See Figure 3-2)
  - a) Remove manual and installation kit taped on top inner tray.
  - b) Remove top inner tray by pulling straight up.
  - c) Securely grasp steel shipping frame (one person each side) and remove STU from carton and bottom inner tray.

### CAUTION

Lift the STU by shipping frame only. Do not support weight of the STU by using any other assemblies as lift points.

- d) Place unit on a clean table or bench top.

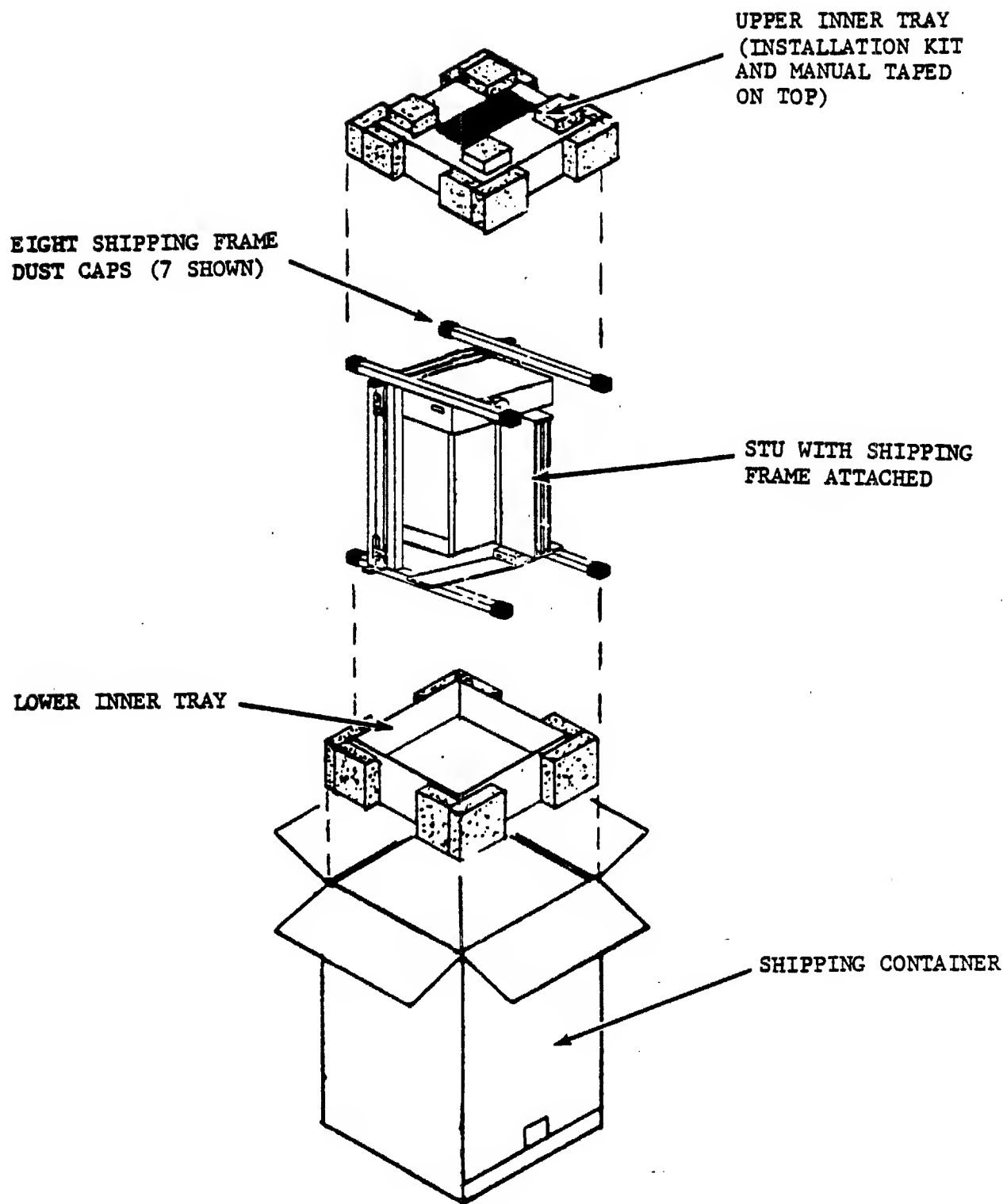


Figure 3-2. STU PACKAGING

- e) Visually inspect the installation kit for the following items:

<u>PART NO.</u>	<u>QUANTITY</u>	<u>PART DESCRIPTION</u>
77013032	1	Hinge Assembly, Top
77013031	1	Hinge Assembly, Bottom
93288008	2	Thrust Bearing
77021760	2	Hinge Blocks
77006921	1	Stiffener Bar
10127156	10	Screw, 1/4-20 x 0.88
10125806	12	Washer, Lock, 1/4
10125301	10	Nut, Hex, 1/4-20
77010091	1	Stud
94873500	1	Bumper, Socket Tip
10127158	1	Screw, 1/4-20 x 1.250
77015830	1	Power Cord (60 Hz Only)
95967880	1	Power Connector (50 Hz Only)
77021730	1	Support Spacer
77021720	2	Support Block
10127154	2	Screw, 1/4-20 x 0.62

- f) Carefully cut and remove non-metallic band securing STU door.
- g) Remove filler blocks located between upper and lower PC board rear-mounted hinges.
- h) Remove door support blocks from under door assembly. (Leave 1-inch frame support block in place until unit is ready for rack mounting.)
- j) Remove filler block located between shipping frame and underside of PC boards by carefully pressing downward, and sliding foam block backward and out from under PC boards.
- k) Remove door stud (P/N 77010091) from installation kit. Screw threaded end into receptacle block inside dust cover door. Unit will not run if stud is not in place to engage interlock switch.

#### CAUTION

If a claim for damage is necessary, be sure that all shipping material is available for evidence of damage and file claim with carrier immediately.

### Acceptance of Unit After Unpacking

Be sure to visually inspect the following areas of the STU before applying power:

- o Front door and control panel for scratches, cracks, or abrasions.
- o Control panel for damaged switches or indicators.
- o PWA assemblies for damaged connectors and components.
- o PWA alignment and seating.
- o Cable connectors and hoses properly attached.

#### NOTE

If a claim for damage is necessary, be sure that all shipping material is available for evidence of damage, and file claim with carrier immediately.

- o Perform CLEANING procedures described in Section II of this manual.

### VERTICAL MOUNTING INSTRUCTIONS

The STU is designed for installation in a standard 19-inch EIA rack. The unit is supported by two hinge assemblies located on the right side of the tape deck and held in the closed position by a single, adjustable pawl fastener. To mount the STU, proceed as follows: (figure 3-3)

### Mounting Instructions

The following instructions, steps 1 thru 13, may be referenced to figures 3-3 and 3-4. Figure 3-3 illustrates the installation hardware mounting locations on the rack while figure 3-4 illustrates installation hardware mounting locations on the STU.

1. Specifically allowing 2.69 inches for STU top clearance, attach upper and lower hinge assemblies ensuring proper pivot pin projections and stiffener to right mounting flange on rack as shown with 1/4-20 x 0.88 inch long machine screws, lockwashers, and hex nuts.

#### NOTE

The stiffener can also be installed to front surface of right mounting flange on rack as a spacer to increase 3.94 inch front projection of STU by 0.19 inch. If so installed, a spacer is provided for installation between support block and left mounting flange on rack in step 3.

2. Install thrust bearings over pivot pins on hinge assemblies.
3. Attach one support block to left mounting flange on rack as shown with 1/4-20 x 0.88 inch long machine screws, lockwashers, and hex nuts.
4. Install rubber bumper assembly to left mounting flange on rack approximately as shown.
5. Remove STU from shipping frame by supporting unit vertically such that four mounting screws can be removed.

#### CAUTION

Use a two-person operation for lifting or maneuvering the unmounted STU - weight is approximately 110 pounds.

6. Attach hinge block to right side of tape deck on STU as shown with 1/4-20 x 0.88 inch long machine screws and lockwashers.
7. Install remaining support block to back of tape deck on left side of STU as shown with 1/4-20 x 0.62 inch long machine screws and lockwashers.

### CAUTION

Ensure that rack is secure against movement or tipping before attempting to mount STU. Lift STU by tape deck only to avoid damage to unit. Do not lift STU by using front door or any of the rear mounted assemblies.

8. Mount STU to rack by positioning tape deck perpendicular to rack such that hinge-halves can be mated. Mate top hinge assembly first and then the bottom.
9. Adjust support block on rack such that tape deck is parallel to top surface of rack when STU is in closed position.
10. Adjust bumper assembly on rack such that tape deck is parallel to mounting flanges on rack when STU is in closed position.
11. Open front door and secure STU against bumper assembly on rack by turning adjusting screw of pawl fastener located on front of tape deck.
12. With front door open, screw stud into threaded hole located at lower left inside corner of door. STU will not operate if stud is not installed to activate interlock switch.
13. On 60 Hz units, connect power cord to power supply receptacle on STU. For 50 Hz units, a power connector is provided for use with a customer supplied power cable to mate with power supply receptacle on STU.
14. Remove protective paper from outside surface of front door window.
15. Remove shipping bracket located on top of card cage that is securing card cage to power supply.

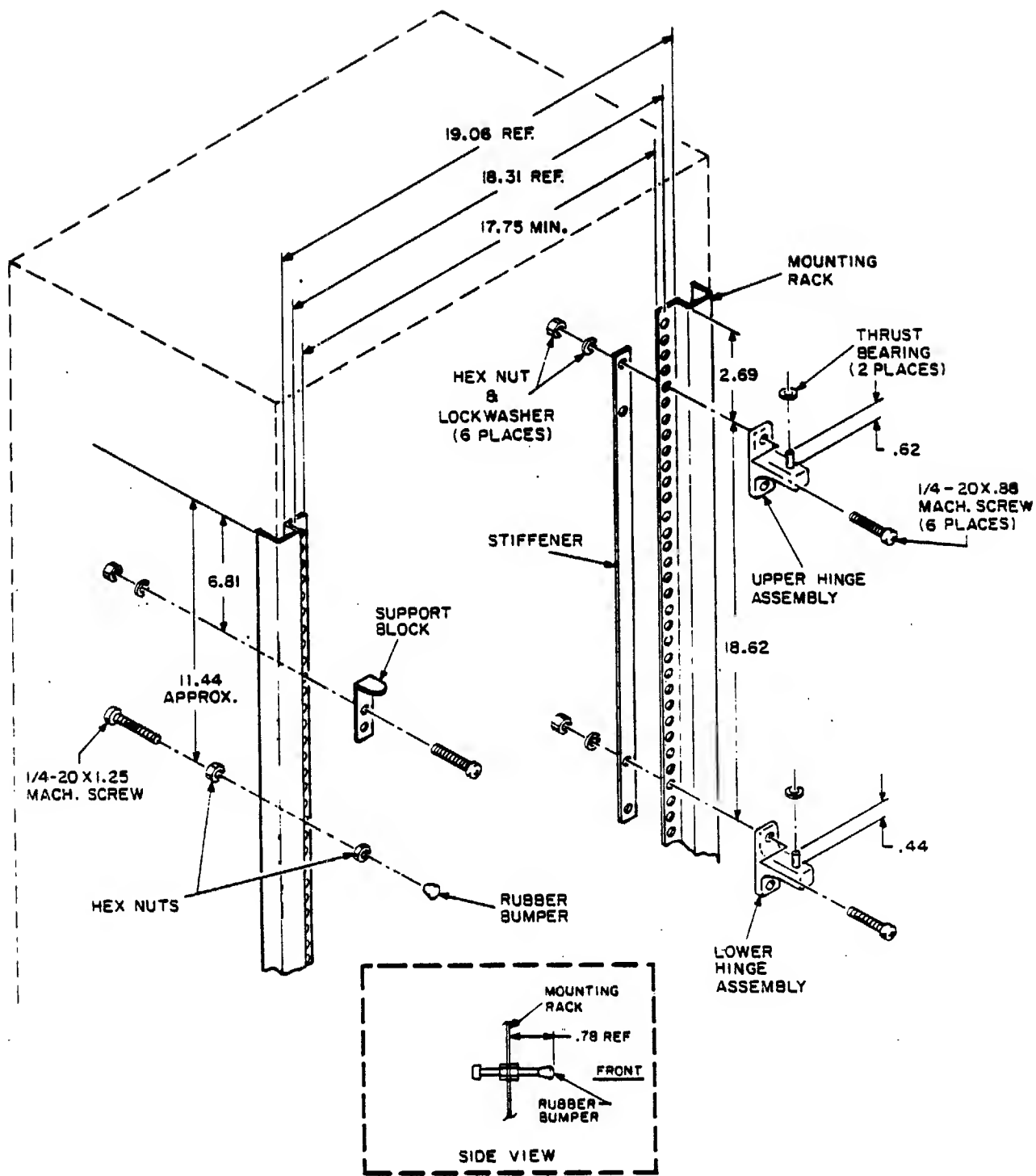


Figure 3-3. Installation Hardware - Rack



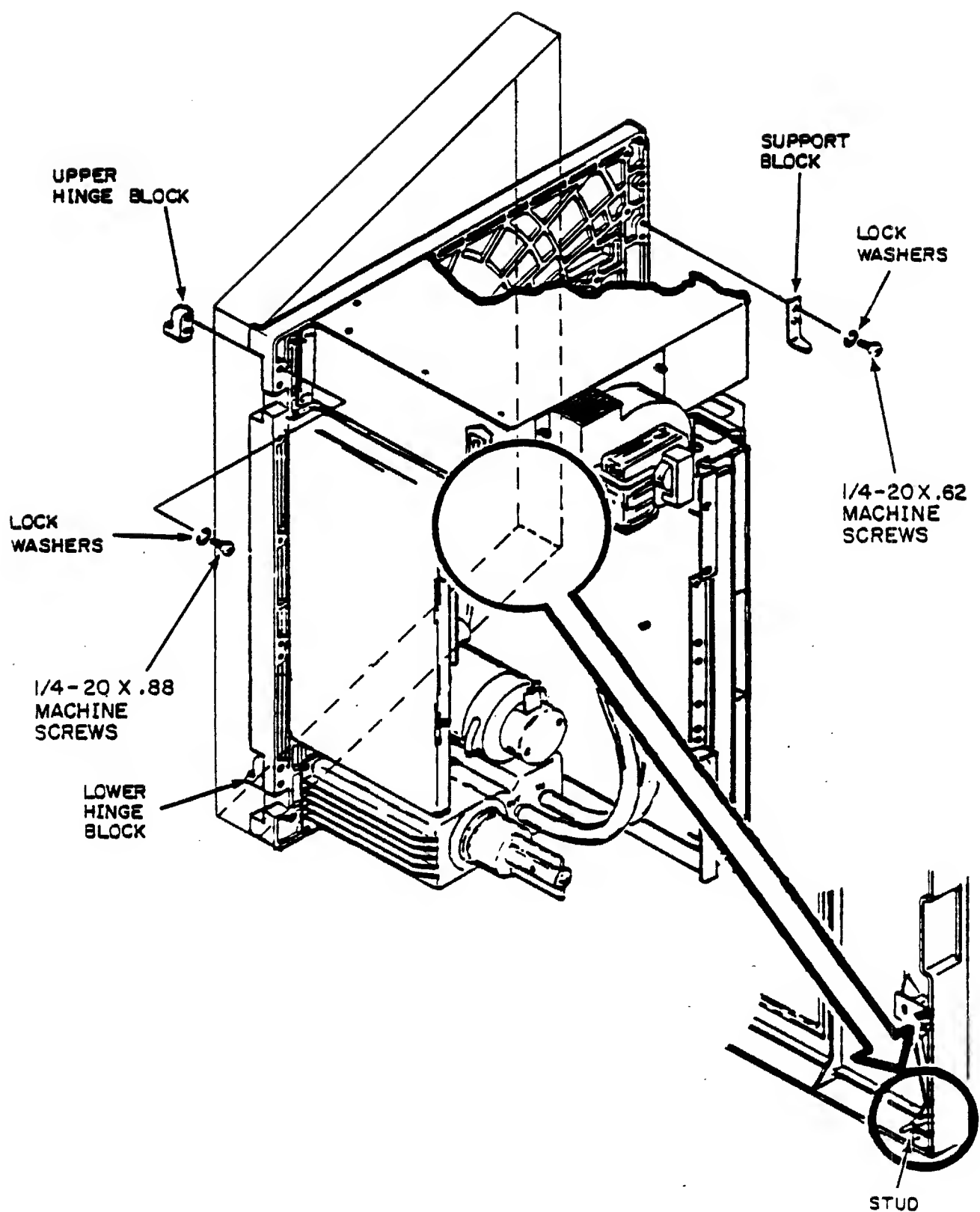


Figure 3-4. Installation Hardware - STU

## CHECKOUT PROCEDURE

The operational checks defined below must be performed prior to submitting the STU to the operating system. The STU does not have to be mounted to perform these checks; the shipping frame will suffice until the unit has been completely checked out.

The following procedures require the use of the diagnostic controls on the control panel. In the event any one of the tests does not perform successfully, a fault code is displayed on the panel. These fault codes are for use by maintenance personnel interpretation and should, therefore, be logged by the operator in the event of test failure. This logging of fault codes and subsequent reporting to maintenance personnel is not restricted to this installation period, but should be standard operating procedure at all times.

### Primary Power

1. Check equipment identification plate located at lower left rear of tape deck to ensure input power coincides with requirements on ID plate.
2. Connect power cord (60 Hz units) or power connector (50 Hz units) to receptacle on power supply located at top right side at the rear of the STU.
3. Place circuit breaker (top right of tape deck) to ON position (1 depressed). Observe that the LOGIC OFF indicator lights.

### Functional Checkout

The functional checkout testing starts with the off-line resident diagnostic to check the tape transport performance, and continues with the resident diagnostic to test the tape subsystem. The acceptance testing must be performed in the following steps:

#### o Power-On Health Check

This self-test diagnostic checks ac power and functionality of the control panel and major logic modules of the transport. To start the health check, press the LOGIC ON pushbutton (assume that the power switch is on and the LOGIC OFF indicator is lit).

After the power-on health check runs successfully, the LOGIC ON indicator lights. If the LOGIC ON indicator fails to light, report the problem to maintenance personnel. If the test is successful, proceed with the STU status test 01 as described below.

- o Test 01

This resident test checks basic transport functions and tape motions including BOT/EOT tape motion, read data, and write data. A write enabled, known good quality tape should be used for this test. This test runs to completion in approximately 13 minutes (with a 2400-foot long tape).

- o Test Conditions

1. STU powered on (LOGIC ON indicator lit). Built-in diagnostics include a power-on health check when operator presses LOGIC ON switch. If an fault occurs at this time, do not attempt further testing; report error code to maintenance personnel.
2. Tape threaded through tape path and onto take-up reel, but NOT loaded.
3. Front door closed.

- o Test Procedure

1. Press TEST switch on diagnostic portion of operator panel.
  - a. DIAGNOSTICS indicator lights.
  - b. 01 is indicated on display panel.
2. Press EXECUTE switch.
  - a. Test commences with display panel incrementing from 00, 11, 22 thru 99. Verify that all segments of numerical display are functioning.
  - b. Concurrent with step a. above, verify that all indicators except LOGIC OFF, BOT, and SELECT are lit.
  - c. Test continues with various motion and read/write exercises for approximately 10 minutes (2400 feet of tape).

o Test Successful

1. If test runs to completion, the STU performs a REWIND/UNLOAD operation and 00 is indicated on display panel, with RESET indicator lit.

o Test Unsuccessful

1. If test is unsuccessful, the diagnostic halts and numerical code appears on display, with RESET indicator lit. Record this number.
2. Refer to Table 3-2 for operator action that may resolve fault without maintenance personnel involvement.

Reinitiate Test 01 after performing any of the above actions. If test is successful, return STU to normal operation. If fault is not resolved, proceed with step 3.

3. Report number recorded in step 1 to maintenance personnel.

Table 3-2. OPERATOR CORRECTIVE ACTION

FAULT CODE	CORRECTIVE ACTION
01 thru 09	Clean magnetic head and tape path per instructions in OPERATOR CLEANING PROCEDURES of this manual.
10	Ensure front door is securely closed.
11	Thread tape.
12	Indicates supply reel hub is not latched, BOT marker is located incorrectly, or a tension fault occurred during a load operation.
13	Refer to tape threading diagram on tape deck to ensure tape is threaded correctly.
14	Check for BOT marker on tape.
15	Indicates RESET switch pressed inadvertently by operator. Reinitiate test.
16	Check for presence of write enable ring in rear of supply reel. Install ring if not present.
17	Check for presence of EOT marker.
18	Indicates tape loaded when test was initiated. Thread tape, but do not press LOAD switch.
20 thru 29	Mount a tape of known good quality.
All Others	Report fault code to maintenance personnel.

### Packaging For Reshipment

Use the original container and packaging material when preparing the STU for reshipment. If original material is not available, new packaging can be obtained by contacting:

Laser Magnetic Storage International Company  
2621 Van Buren Avenue  
Valley Forge Corporate Center  
Norristown, PA 19403  
Attn: OEM Marketing

Dismount the STU from the mounting rack and prepare for shipment as follows: (refer to Figure 3-5)

1. Turn off all power control switches.
2. Disconnect power cable from STU.
3. Remove STU from mounting rack.
4. Remove mounting hinges and hardware from STU and retain for shipment with STU.

#### NOTE

All loose piece parts removed from STU and mounting frame should be retained in a plastic bag for shipment with STU.

#### CAUTION

Do not attempt to package the STU without shipping frame.

5. Mount STU to shipping frame using four screws (1/4-20 x 1-3/4).
6. Remove rack hinges, thrust bearings, stiffener bar and mounting hardware, and retain for shipment.
7. Remove bumper assembly from rack frame and retain.
8. Remove door stud (interlock switch actuator) and retain for shipment.

9. With front door closed, insert two door and deck support blocks (19-1/2" x 1" x 1/4" plywood strips) between top of deck/door and shipping frame. Insert two more support blocks between bottom of deck/door and shipping frame.
10. Carefully insert filler block across bottom rear of shipping frame. Press downward while sliding filler block forward until foam block is completely under logic cage. This will support underside of logic cage during shipping. Tape both ends of wooden brace to metal shipping frame to prevent movement.
11. Insert a small piece of filler block (3/4" x 3/4" x 1-1/4") inside of each (upper and lower) rear logic cage pivot bracket.
12. Strap door in closed position with a length of plastic strap. Make one turn around door and tape deck. Place two jiffy sleeves under strap to protect door finish. Attach buckle and secure strap.
13. Lift STU (using shipping frame only) and carefully place into lower inner tray inside of shipping container.
14. Place upper inner tray in position over STU. Place technical manual, plastic bag containing all loose mounting piece parts, and AC cord (60 Hz) or AC connector (50 Hz) on top of inner tray and secure with filament tape.
15. Close and seal shipping carton with 3-inch wide carton sealing tape.

UPPER INNER TRAY  
INSTALLATION KIT  
AND MANUALS TAPED  
ON TOP

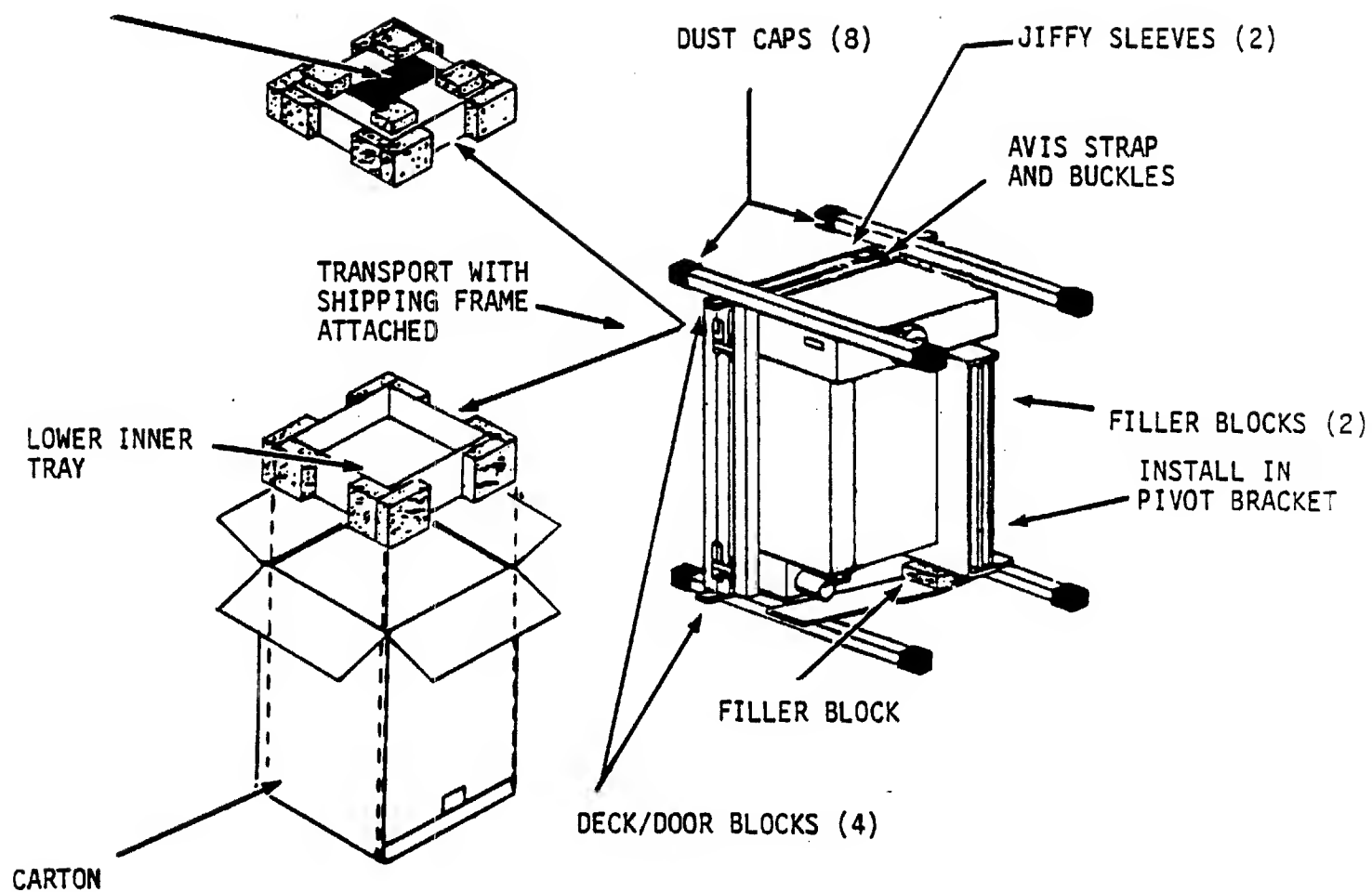


Figure 3-5. Packaging For Reshipment





## HORIZONTAL MOUNT STU WITHOUT CABINET

### GENERAL DESCRIPTION

The Streaming Tape Unit (STU) can be horizontally mounted in either a CDC/OEM standard or customer designed cabinet.

The STU is supported by a pivot arrangement that allows the unit to be rotated to either one of two positions:

1. The unit is in a vertical position.
2. The unit is 25° beyond the vertical position.

The STU is held in the closed position by an adjustable pawl fastener.

For horizontal mounting applications, the unit will be delivered without a front door and without the operator panel mounted on the tape deck. The cut-out in the tape deck used for attaching the operator panel on the vertical mounted unit is covered by a flat plate. The operator panel will be packaged in a bubble bag for protection.

### PHYSICAL AND ELECTRICAL CHARACTERISTICS

The STU physical and electrical characteristics are listed in table 3-3.

Table 3-3. STU PHYSICAL AND ELECTRICAL CHARACTERISTICS

Weight	59.87 kg (117 pounds) packaged 49.90 kg (110 pounds) in frame
Dimensions	
Height	60.9 cm (24.0 inches)
Width	48.26 cm (19.0 inches)
Depth Overall	44.45 cm (17.55 inches)
Depth From Mounting Surface	34.56 cm (13.61 inches)
Operating Temperature	15°C (60°F) to 33°C (90°F)
Non-Operating Temperature (Storage)	-10°C (14°F) to 50°C (+122°F)
Relative Humidity (Operating)	20% to 80% (no condensation) with maximum wet bulb temperature of 26°C (79°F)
Relative Humidity (Non-Operating)	10% to 90% (storage) 5% to 95% (transit)
Altitude (Operating)	Up to 3048m (10,000 ft) equivalent to a barometric pressure of 688 millibars
Altitude (Non-Operating)	Up to 3048m (10,000 ft) equivalent to a barometric pressure of 688 millibars
Power	
Voltage	120V (93 min. to 128 max.) 60 Hz, single phase, 2-wire plus ground  220 or 240V (187 min. to 256 max.) 50 Hz, single phase, 2-wire plus ground
Average Input Current	120V - 3.0 amps RMS 220-240V - 1.5 amps RMS
Average Continuous Power	300 VA - standby and loaded 550 VA maximum - start/stop
Mounting	In-cabinet horizontal mounting

## SITE REQUIREMENTS

### Power Requirements

The STU input power requirements are 120 VAC (60 Hz) or 220-240 VAC (50 Hz), single phase, 2-wire, plus ground with shielded power cord. The input power cord (P/N 77015830) is supplied with 60 Hz units. The input power connector (P/N 95967880) is supplied with 50 Hz units. Refer to table 3-3 for voltage tolerances and current/power characteristics.

### Grounding

The STU is connected to earth ground via the power cord. An EMC ground is provided by system-grounding the shielded jackets of the I/O cables. Logic ground is furnished via the interface connector. A single-point grounding scheme is used to connect logic ground to frame/earth ground.

## UNPACKING AND INSPECTION

### Acceptance of Delivery

Carefully inspect the shipping container on all sides, including top and bottom, for severe gouges, tears, or smashed corners or edges. These conditions constitute mishandling in shipment and the unit may have been damaged. If there is any evidence of damage to the shipping container, the carrier representative should record the damage and sign acknowledging the damage before you accept delivery.

### Unpacking Instructions

Each STU is packed in a 500-pound tested, double-wall corrugated container, 23 inches by 24-1/2 inches by 31-1/2 inches high, with inner protective packaging as shown in figure 3-10. Unpack the STU in the area or room where it will be installed. Because of the weight of the packaged STU (approximately 117 pounds), unpacking requires two people. Perform the unpacking as follows:

### CAUTION

When performing step 1, use a utility knife or other short-blade instrument to ensure that STU is not scratched.

1. Place carton with arrows pointing up. Cut reinforcing tape at top of carton (three places) and fold four carton flaps back.
2. Remove STU and all protective packaging as follows: (See figure 3-6)
  - a) Remove manuals, power cord (60 Hz) or power connector (50 Hz), and installation kit taped on top inner tray.
  - b) Remove top inner tray by pulling straight up.
  - c) Securely grasp steel shipping frame (one person each side) and remove STU from carton and bottom inner tray.

#### CAUTION

Lift the STU by shipping frame only. Do not support weight of the STU by using any other assemblies as lift points.

- d) Place unit on a clean table or bench top
- e) Remove filler blocks located between upper and lower PWA rear-mounted hinges.
- f) Leave 1-inch frame support block in place until unit is ready for mounting.
- g) Remove filler block located between shipping frame and underside of PWAs by carefully pressing downward, and sliding foam block backward and out from under PC boards.

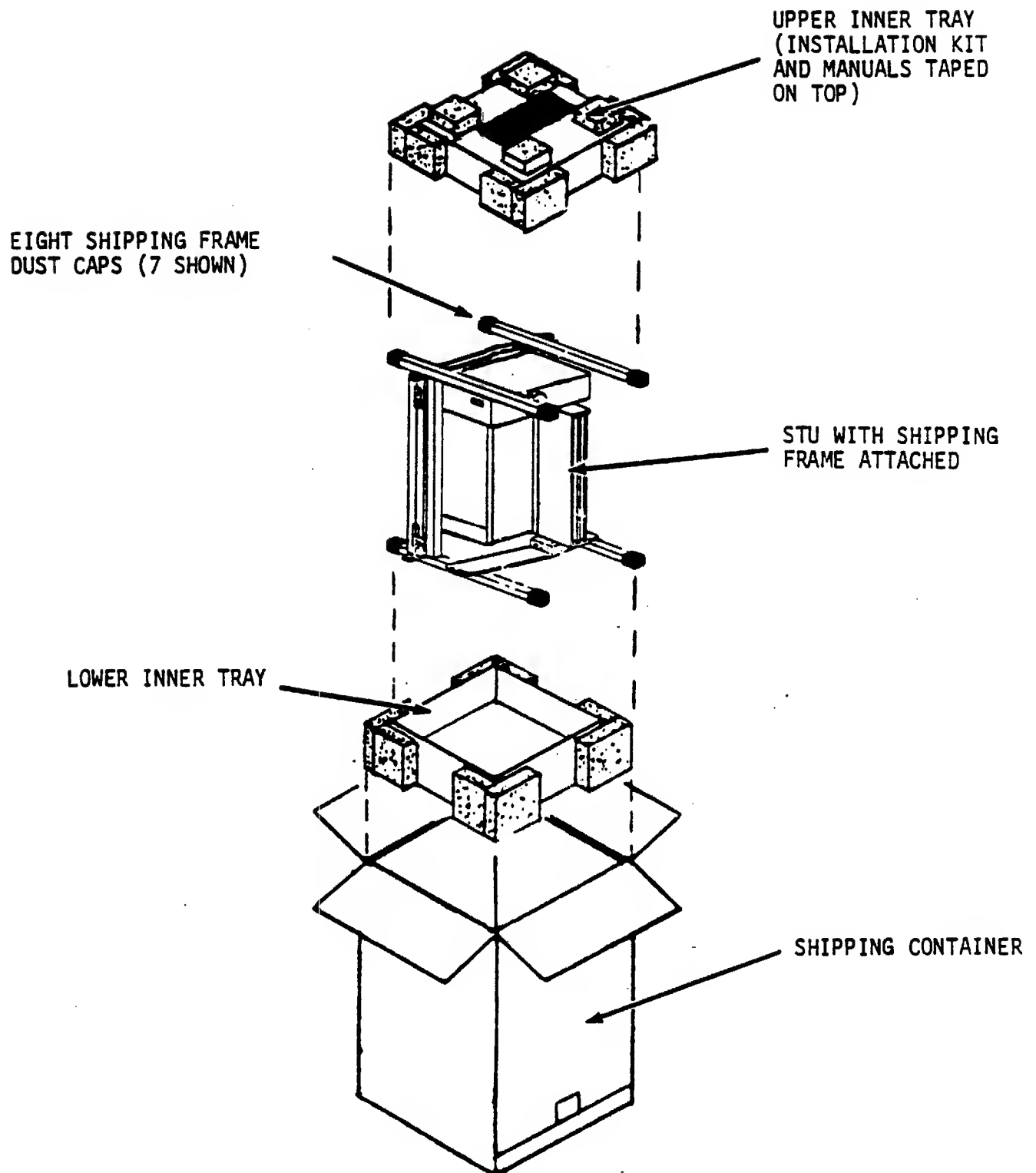


Figure 3-6. STU Packaging

- h) Visually inspect the installation kit for the following:

HORIZONTAL INSTALLATION KIT

PART DESCRIPTION	QUANTITY	PART NO.
Stud, Pivot	2	77015290
Bearing, Nylon	2	93847011
Cover, Hinge Block	2	77015139
Washer, Plain, 6	4	10125605
Bracket, Pivot	2	77015120
Nut, Self-Locking, 10-32	8	00860109
Screw, Self-Tapping, 6-20 x 0.75	4	95655519
Screw, Machine, 1/4-20 x 0.62	8	95843350
Screw, Machine, 8-32 x 0.38	2	95959746
Screw, Machine, 1/4-20 x 0.50	4	95843349
Screw, Machine, 10-32 x 0.31	2	95959766
Screw, Machine, 6-32 x 0.31	4	95959724
Screw, Machine, 8-32 x 0.25	1	95959744
Screw, Flat Head, 10-32 x 0.44	8	10125941
Indexing Pin Assembly	1	77018522
Ground Cable Assembly	1	76992342
Terminal, Foil Grounding	1	77009840
Cap	2	77015320
Label, Fault Recovery	1	77019823

#### NOTE

If reshipment of unit is necessary, retain all shipping materials and container.

#### Acceptance of Unit After Unpacking

Be sure to visually inspect the following areas of the STU before applying power:

- o Control panel for damaged switches or indicators.
- o PWA assemblies for damaged connectors and components.
- o PWA alignment and seating.
- o Cable connectors and hoses properly attached.

#### NOTE

If a claim for damage is necessary, be sure that all shipping material is available for evidence of damage, and file claim with carrier immediately.

- o Perform CLEANING procedures described in Section II of this manual.



## HORIZONTAL MOUNTING PROCEDURE

The following procedures, steps 1 thru 15, may be referenced to Figures 3-7 and 3-8. Figure 3-7 illustrates the installation hardware mounting locations on the cabinet while Figure 3-8 illustrates installation hardware mounting locations on the STU.

1. Mount pivot studs to inside surfaces of cabinet as shown with 10-32 x .44 inch long flat head machine screws and nuts.
2. Install nylon bearings over pivot studs in cabinet as shown.
3. Remove STU from shipping frame by supporting unit vertically such that the four mounting screws can be removed.

### CAUTION

Use a two-person operation for lifting or maneuvering the unmounted STU-weight is approximately 100 pounds.

4. Turn STU over so that unit is in a vertical position, resting on the power supply assembly (Figure 3-8).

### CAUTION

Do not rest STU on logic cage end (bottom) or lay face down to avoid damage to unit.

5. Attach hinge block covers to the side of tape deck on STU as shown with #6-20 x 0.75 inch self-tapping screws and flat washers.
6. Install pivot brackets to the back of tape deck on STU as shown with 1/4-20 x 0.62 inch machine screws.
7. Attach indexing pin assembly to inside surface of pivot bracket located on pawl fastener side of STU as shown using #8-32 x 0.38 inch washer head machine screws.

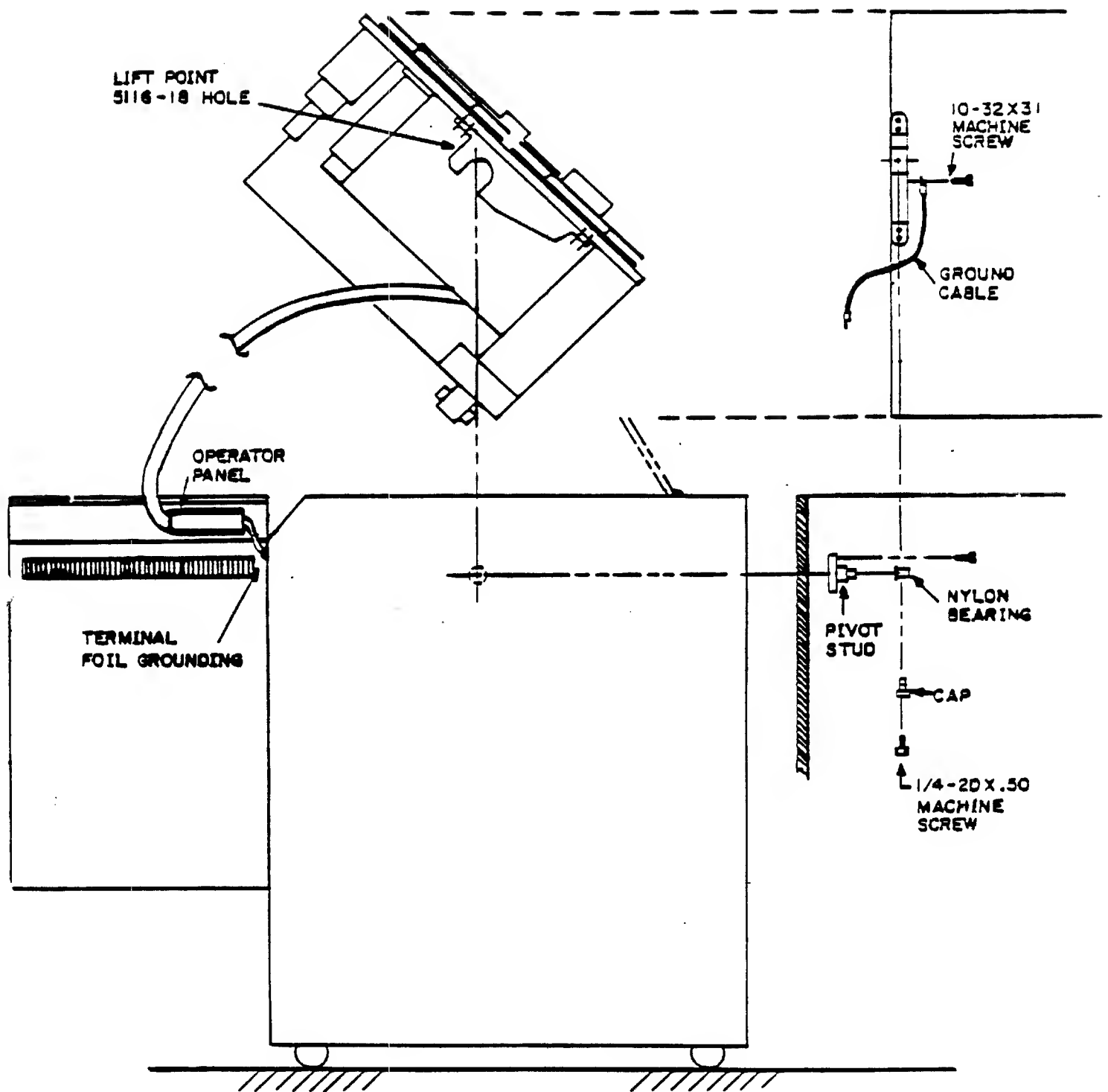


Figure 3-7. INSTALLATION HARDWARE - CABINET

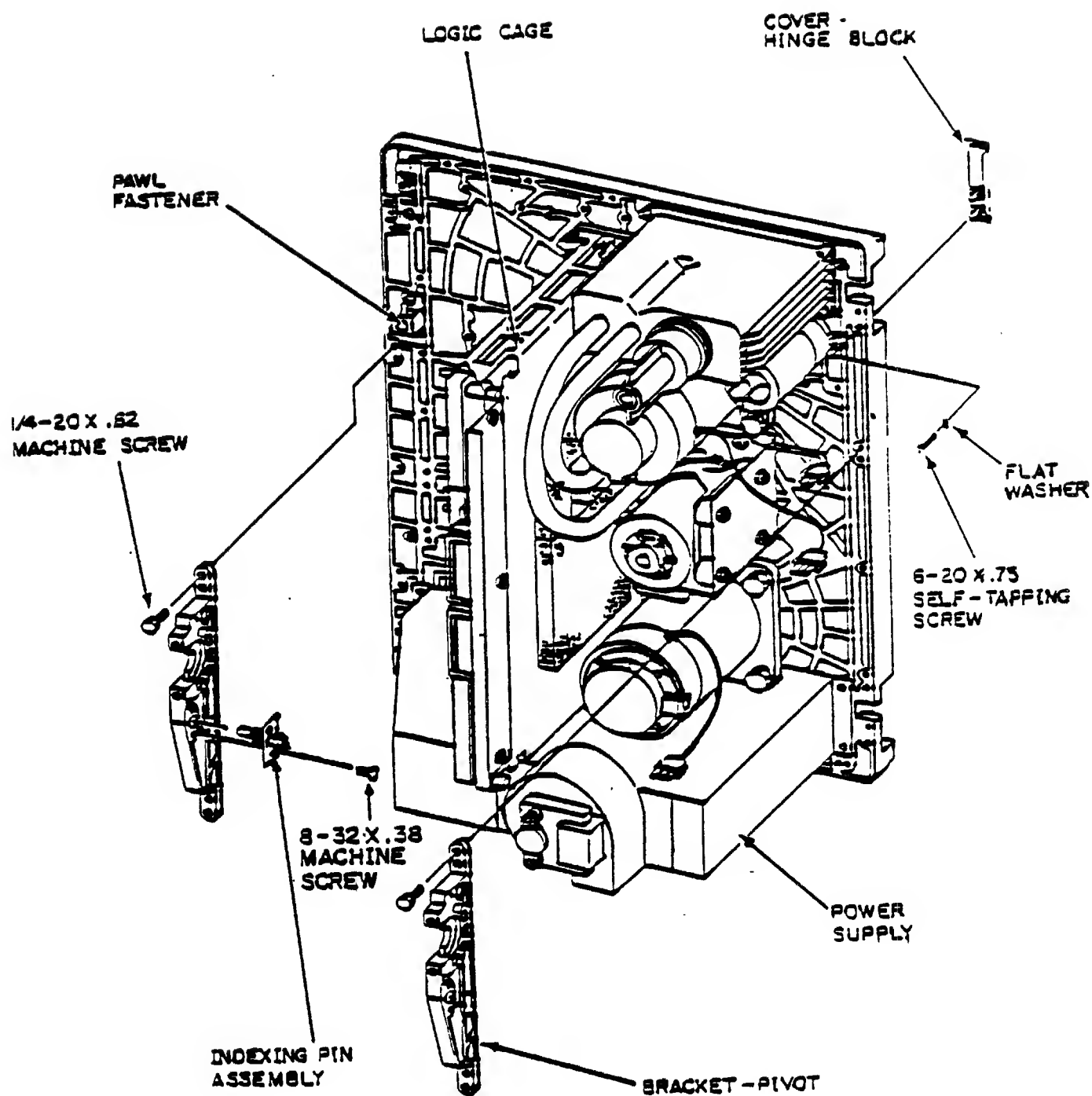


Figure 3-8. INSTALLATION HARDWARE - STU

### CAUTION

Ensure that the cabinet is secure against movement before attempting to mount the STU. Lift STU by tape deck only to avoid damage to unit. Threaded holes (5/16-18) are provided in the end of pivot brackets for use as lift points to assist in mounting the STU.

8. Lower power supply end (top) of STU into cabinet with unit tilted at approximately  $45^{\circ}$  such that logic cage end (bottom) of unit is pointed toward front of cabinet.
9. Carefully position STU onto pivot studs in cabinet ensuring nylon bearings are not damaged. Rotate unit slightly until indexing pin engages first hole in cabinet at approximately  $37^{\circ}$  above horizontal.
10. Install caps over pivot studs in cabinet to pivot brackets on STU as shown using 1/4-20 x 0.50 inch long machine screws.
11. Attach ground cable assembly between inside surface of left pivot bracket on STU as shown using #10-32 x 0.31 inch washer head machine screw and inside surface of cabinet.
12. Install operator panel of STU to front door of cabinet with 6-32 x .31 inch long machine screws with lockwashers.
13. Insert end of ground strip on operator panel into foil grounding terminal and attach to front door of cabinet with 8-32 x .25 inch long machine screw and external tooth lockwasher.
14. Connect power cord between STU and terminal block on inside vertical frame member in rear of cabinet, then connect a power cord from the terminal block to external supply.
15. Place STU in closed position and secure against deck latch bracket on cabinet by turning adjusting screw of pawl fastener located on front of tape deck.

## CHECKOUT PROCEDURE

Perform operational checks defined below before connecting the STU to the operating system. The STU does not have to be mounted to perform these checks; the shipping frame may be used to hold the unit for checkout.

The following procedures require the use of the diagnostic controls on the control panel. If any one of the tests does not perform successfully, a fault code is displayed on the panel. These fault codes are for use by maintenance personnel and should, therefore, be logged in the event of test failure. This logging of fault codes and subsequent reporting to maintenance personnel is not restricted to this installation period, but should be standard operating procedure at all times.

### Primary Power Checkout

1. Check equipment identification plate located at lower left rear of tape deck to ensure input power matches the requirements on ID plate.
2. Connect the power cord (60 Hz units) or power connector (50 Hz units) to receptacle on power supply located at top right side at the rear of the STU.
3. Place circuit breaker (top right of tape deck) to ON position (1 pressed). Observe that LOGIC OFF indicator lights.

### Functional Checkout

The functional checkout testing starts with the off-line resident diagnostic to check the tape transport power, logic, and control circuits, power-on health check, and continues with the resident diagnostic to test the tape subsystem (test 01). The acceptance testing must be performed in the following steps:

#### o Power-On Health Check

This self-test diagnostic checks dc power and performance of the control panel and major logic circuits of the transport. To start health check, press the circuit breaker on (1 down).

After the power-on health check runs successfully, the LOGIC ON indicator lights. If LOGIC ON indicator fails to light, report the problem to maintenance personnel. If the test is successful, proceed with STU test 01 as described below.

o Test 01

This resident test checks basic transport functions and tape motions, including BOT/EOT tape motion, read data, and write data. Use a write-enabled, known good quality tape for this test. This test runs to completion in approximately 13 minutes with a 2400-foot long tape.

o Test Conditions

1. STU powered on (LOGIC ON indicator lit). Built-in diagnostics include a power-on health check when operator presses circuit breaker in ON position (1 down). If a fault occurs at this time, do not attempt further testing; report error code to maintenance personnel.
2. Tape threaded through tape path and onto take-up reel, but NOT loaded.
3. With the absence of a front door, an interlock defeat key (not supplied) must be inserted in interlock switch and turned clockwise 90° (refer to Figure 3-9).

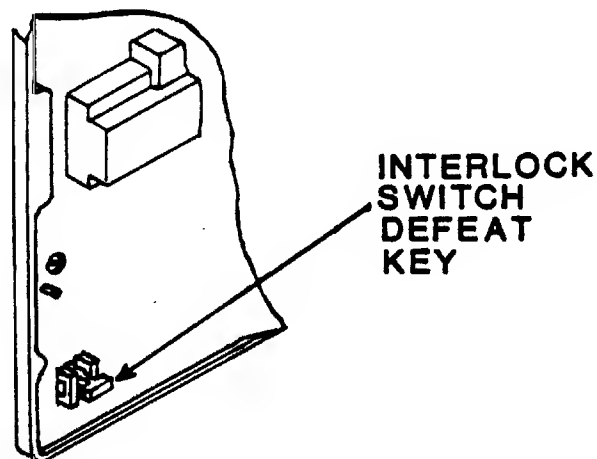


Figure 3-9. Interlock Switch Defeat Key

o Test Procedure

1. Press TEST switch on diagnostic portion of operator panel.
  - a. DIAGNOSTICS indicator lights.
  - b. 01 is indicated on display panel.
2. Press EXECUTE switch.
  - a. Test commences with display panel incrementing from 00, 11, 22 thru 99. Verify that all segments of numerical display are functioning.
  - b. Concurrent with step a. above, verify that all indicators except LOGIC OFF, BOT, and HIGH DENSITY are lit.
  - c. Test continues with various motion and read/write exercises for approximately 13 minutes (with 2400-foot reel of tape).

o Test Successful

1. If test runs to completion, the STU performs a REWIND/UNLOAD operation and 00 is indicated on display panel, with RESET indicator lit.

o Test Unsuccessful

1. If test is unsuccessful, the diagnostic halts and numerical code appears on display, with RESET indicator lit. Record this number.
2. Refer to table 3-4 for operator action that may resolve fault without maintenance personnel involvement.

Reinitiate test 01 after performing any of the above actions. If test is successful, return STU to normal operation. If fault is not resolved, proceed with step 3.
3. Report number recorded in step 1 to maintenance personnel.

Table 3-4. OPERATOR CORRECTIVE ACTION

FAULT CODE	CORRECTIVE ACTION
01 thru 09	Clean magnetic head and tape path as described in OPERATOR CLEANING PROCEDURES of this manual.
10	Ensure top cover is securely closed.
11	Thread tape.
12	Indicates supply reel hub is not latched, BOT marker located incorrectly, or a tension fault occurred during load operation.
13	Refer to tape threading diagram on tape deck to ensure tape is threaded correctly.
14	Check for BOT marker on tape.
15	Indicates operator pressed RESET switch by mistake. Reinitiate test.
16	Check for presence of write enable ring in rear of supply reel. Install ring if not present.
17	Check for presence of EOT marker.
18	Indicates tape loaded when test was initiated. Thread tape, but do not press LOAD switch.
20 thru 29	Mount a tape of known good quality.
All Others	Report fault code to maintenance personnel.



### Packaging For Reshipment

Use the original container and packaging material when preparing the STU for reshipment. If original material is not available, new packaging can be obtained by contacting:

Laser Magnetic Storage International Company  
2621 Van Buren Avenue  
Valley Forge Corporate Center  
Norristown, PA 19403  
Attn: OEM Marketing

Remove the STU from the cabinet and prepare for shipment as follows: (refer to Figure 3-10)

1. Turn off all power control switches.
2. Disconnect power cable from STU.
3. Remove STU from mounting rack.
4. Remove pivot brackets, indexing pin assembly, hinge block covers, and hardware from STU and retain for shipment with STU.

#### NOTE

All loose piece parts removed from STU and mounting frame should be retained in a plastic bag for shipment with STU.

#### CAUTION

Do not attempt to package the STU without shipping frame.

5. Mount STU to shipping frame using four screws (1/4-20 x 1-3/4).
6. Remove nylon bearings and pivot studs from inside surface of cabinet. Retain for shipment.
7. Insert deck support blocks (19-1/2" x 1" x 1/4" plywood strips) between top of deck and shipping frame. Insert two more support blocks between bottom of deck and shipping frame.

8. Carefully insert filler block across bottom rear of shipping frame. Press downward while sliding filler block forward until foam block is completely under logic cage. This will support underside of logic cage during shipping. Tape both ends of wooden brace to metal shipping frame to prevent movement.
9. Insert a small piece of filler block ( $3/4''$  x  $3/4''$  x  $1-1/4''$ ) inside of each (upper and lower) rear logic cage pivot bracket.
10. Lift STU (using shipping frame only) and carefully place into lower inner tray inside of shipping container.
11. Place upper inner tray in position over STU. Place technical manual, plastic bag containing all loose mounting piece parts, and AC cord (60 Hz) or AC connector (50 Hz) on top of inner tray and secure with filament tape.
12. Close and seal shipping carton with 3-inch wide carton sealing tape.

UPPER INNER TRAY  
INSTALLATION KIT  
AND MANUALS TAPED  
ON TOP

DUST CAPS (8)

JIFFY SLEEVES (2)

AVIS STRAP  
AND BUCKLES

TRANSPORT WITH  
SHIPPING FRAME  
ATTACHED

LOWER INNER  
TRAY

FILLER BLOCKS (2)

INSTALL IN  
PIVOT BRACKET

FILLER BLOCK

DECK/DOOR BLOCKS (4)

CARTON

Figure 3-10. Packaging For Reshipment

## IN-CABINET HORIZONTAL MOUNTED STU

### GENERAL DESCRIPTION

The Streaming Tape Unit (STU) is shipped mounted in a Laser Magnetic Storage International Company/OEM horizontal cabinet. The bottom of the cabinet can be utilized to mount additional equipment.

The STU is supported by a pivot arrangement that allows the unit to be rotated to any one of the following two service positions:

1. The unit is in a vertical position.
2. The unit is 25° beyond the vertical position.

The STU is held in the closed position by an adjustable pawl fastener.

### PHYSICAL AND ELECTRICAL CHARACTERISTICS

The STU physical and electrical characteristics are listed in table 3-5.

### SITE REQUIREMENTS

#### Power Requirements

The STU input power requirements are 120 VAC (60 Hz) or 220-240 VAC (50 Hz), single-phase, 2-wire, plus ground with shielded power cord. AC power is distributed to the tape drive via a junction box mounted inside the rear of the cabinet (figure 3-11). The junction box on 120 VAC (60 Hz) units is supplied with a main power cable. It is the customer's responsibility to supply the main power cable for 220-240 VAC (50 Hz) units.

#### Grounding

The STU is connected to earth ground via the power cord. An EMC ground is provided by system-grounding the shielded jackets of the I/O cables. Logic ground is furnished via the interface connector. A single-point grounding scheme is used to connect logic ground to frame/earth ground.

The junction box assembly has two grounding lugs, one for the terminal block ground cable and the other for the main power cable.

Table 3-5. STU PHYSICAL AND ELECTRICAL CHARACTERISTICS

Weight	148 kg (328 pounds) packaged 49.90 kg (289 pounds) in frame
Dimensions	
Height	111 cm (43.75 inches)
Width	74 cm (29 inches)
Depth Overall	105 cm (41.5 inches)
Operating Temperature	15°C (60°F) to 33°C (90°F)
Non-Operating Temperature (Storage)	-10°C (14°F) to 50°C (+122°F)
Relative Humidity (Operating)	20% to 80% (no condensation) with maximum wet bulb temperature of 26°C (79°F)
Relative Humidity (Non-Operating)	10% to 90% (storage) 5% to 95% (transit)
Altitude (Operating)	Up to 3048m (10,000 ft) equivalent to a barometric pressure of 688 millibars
Altitude (Non-Operating)	Up to 3048m (10,000 ft) equivalent to a barometric pressure of 688 millibars
Power	
Voltage	120V (93 min. to 128 max.) 60 Hz, single phase, 2-wire plus ground  220 or 240V (187 min. to 256 max.) 50 Hz, single phase, 2-wire plus ground
Average Input Current	120V - 3.0 amps RMS 220-240V - 1.5 amps RMS
Average Continuous Power	300 VA - standby and loaded 550 VA maximum - start/stop
Mounting	In-cabinet horizontal mounting

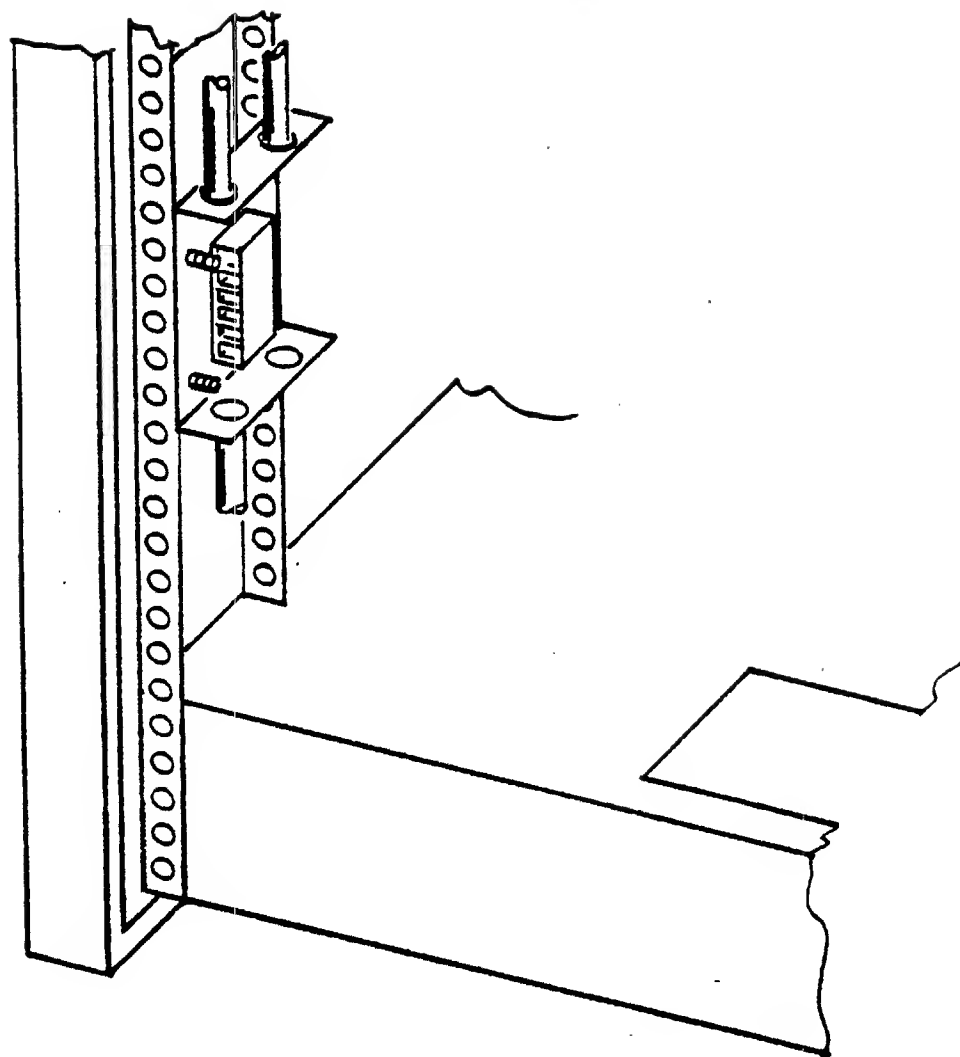


Figure 3-11. Junction Box Assembly

## UNPACKING AND INSPECTION

### Acceptance of Delivery

Carefully inspect the shipping container on all sides, including top and bottom, for severe gouges, tears, or smashed corners or edges. These conditions constitute mishandling in shipment and the unit may have been damaged. If there is any evidence of damage to the shipping container, the carrier representative should record the damage and sign acknowledging the damage before you accept delivery.

### Unpacking Instructions

1. All shipping materials should be retained in case of future unit reshipment. Steps 2 thru 11 may be referenced to figure 3-12.
2. Cut and remove the two plastic strapping bands and the angleboards from the shipping container.
3. Lift and remove the top container cover.
4. Lift and remove the shipping carton from around the unit.
5. Lift and remove the two ramps and protective cardboard from the top of the unit.
6. Remove the two straps from around the polybag and the angleboards.
7. Remove the polybag cover from the unit.
8. Remove the four shipping bolts and washers securing the shipping brackets to the pallet, using a 9/16 inch open-end wrench.
9. Remove the four shipping brackets from around the levelers on the unit.
10. Set up the left and right ramp assemblies by inserting the end plate of the ramps into the groove in the rear of the pallet.

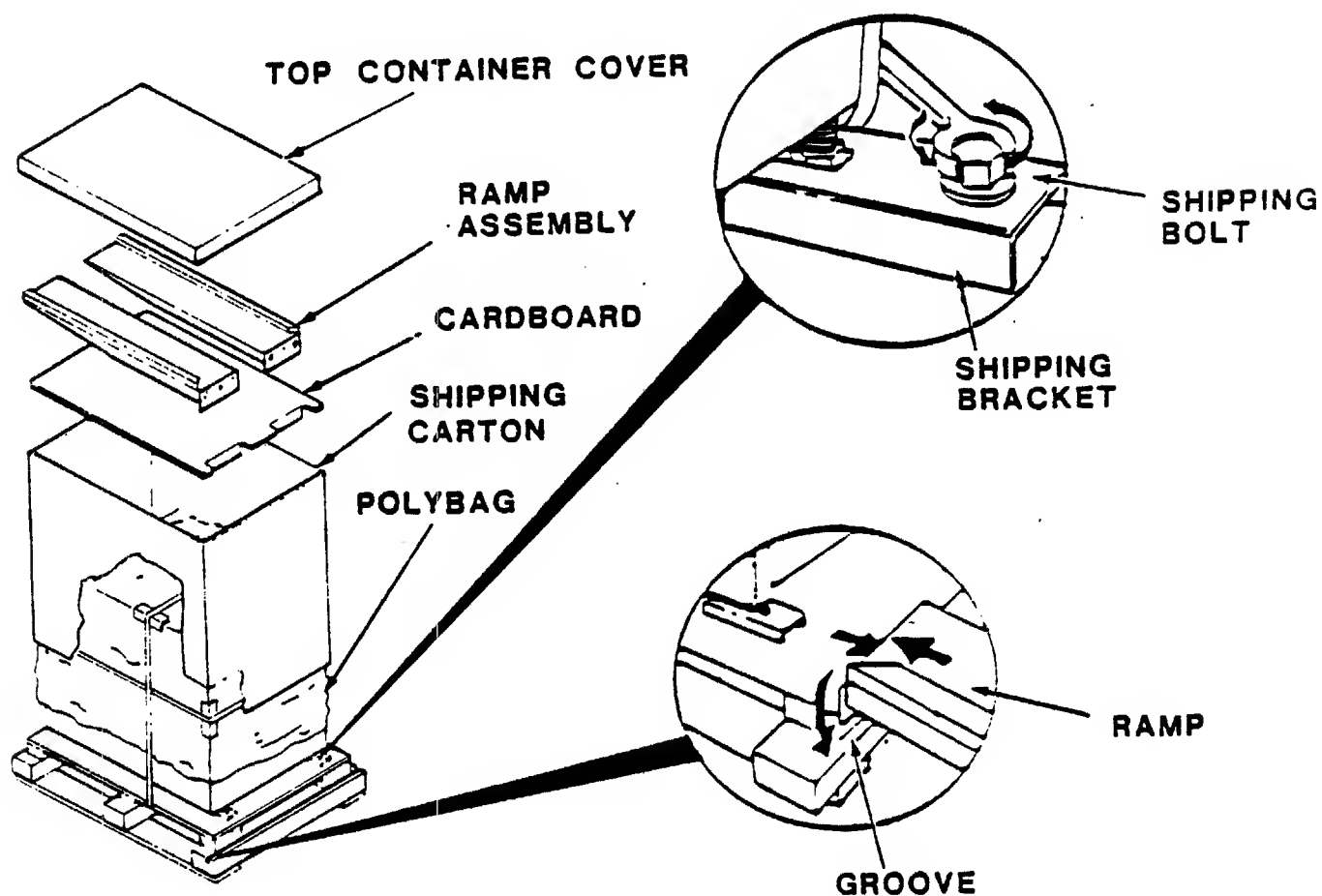
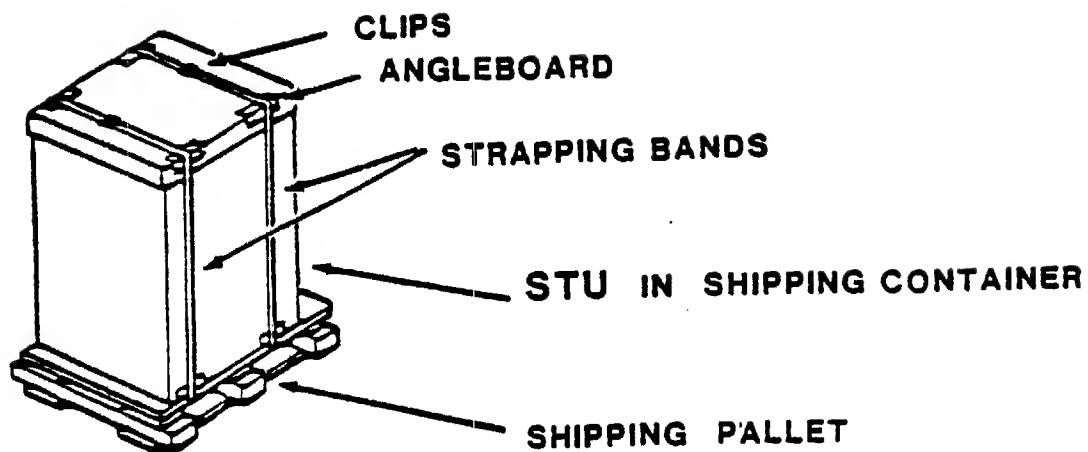


Figure 3-12. In Cabinet STU Unpacking



### WARNING

In step 11, take extreme care to prevent the unit from rolling uncontrolled off either side of the pallet after releasing the levelers. Removal of the unit from the pallet is a two-person procedure.

11. Raise the levelers using a 1/2 inch open-end wrench until the cabinet is free to roll. Carefully guide (two-person operation) the unit onto the ramps and down to the floor.
12. Open the front dust cover door latch with a 1/8 inch hex wrench. See figure 3-14.
13. Lift the top cover.
14. From the underside of the tape deck, remove the two slotted hex head screws (one on left side and one on right side) passing through the angle brackets into the tape deck. See figure 3-13.
15. Using a straight slot screwdriver, rotate the pawl fastener on the left side of the tape deck one-half turn counterclockwise to release the tape deck.
16. Reach into the left side of the cabinet, grasp the tape deck latch, and pull the ring out to release the catch.
17. Lift the deck to the maintenance position.
18. Remove the filament tape and the tie-wraps from the PWAs. See figure 3-15.
19. Remove the hinge cover kit, P/N 77023062, taped to the manual packet in the bottom of the cabinet and attach the hinge block cover to the top of the tape deck with two #6-20 x .75 inch self-tapping screws and flat washers. See figure 3-13.
20. Return the deck to the operating position and secure by rotating the pawl fastener clockwise.

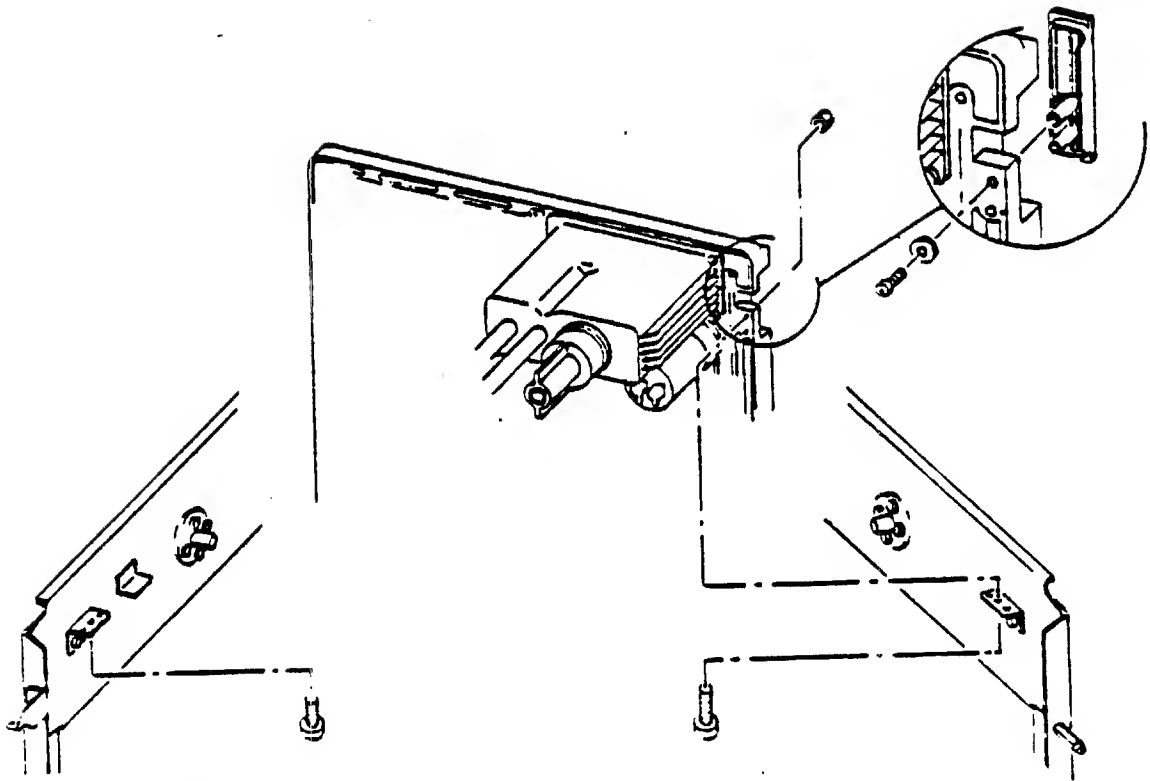


Figure 3-13. Tape Deck Shipping Screws

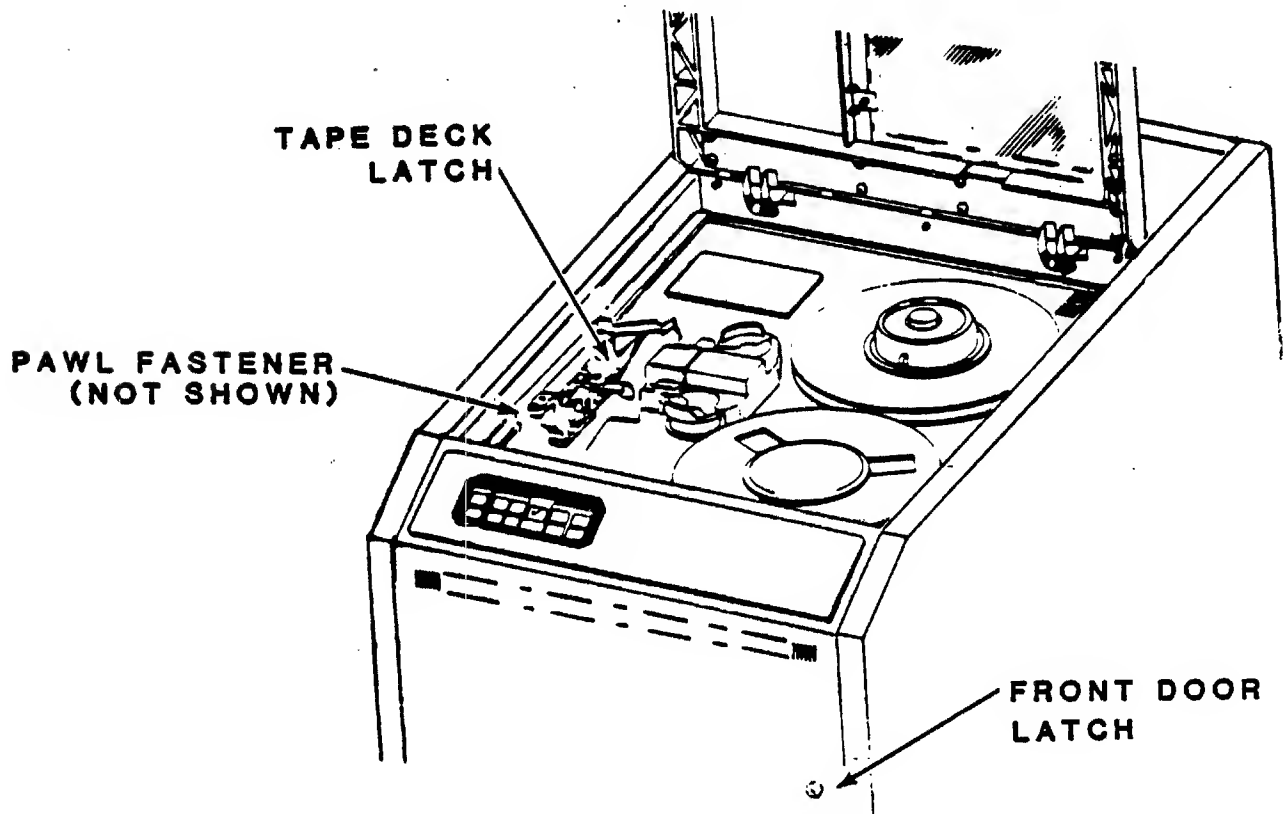


Figure 3-14. Tape Deck Access

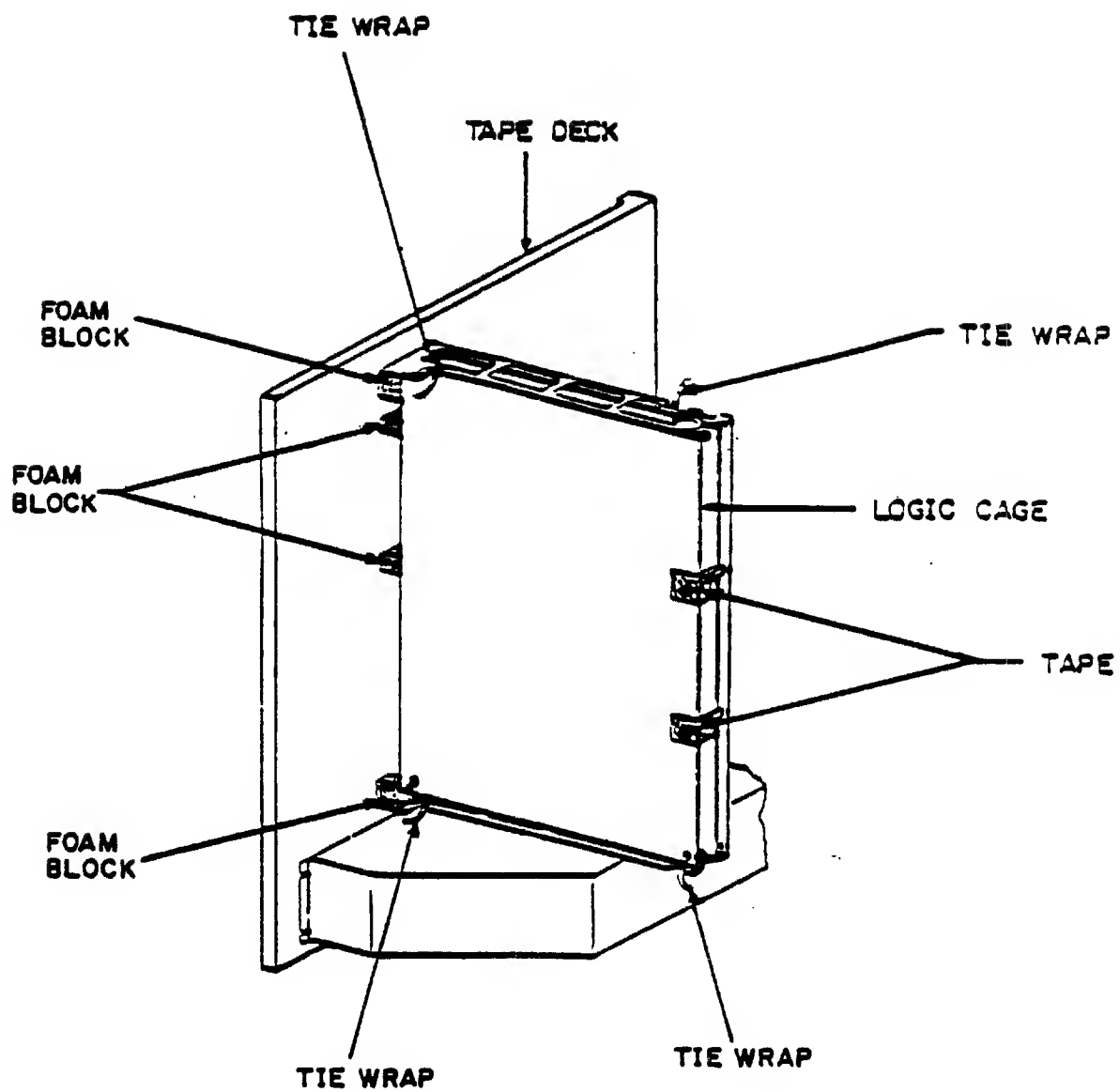


Figure 3-15. Tape Deck Shipping Material

21. On 60 Hz units, connect main power cable to power source.  
On 50 Hz units, refer to figures 3-16 and 3-17:
  - a. Route main power cable, that meets local safety standards and is protected by a circuit breaker or fusing adequate for current rating of unit, into junction box.
  - b. Connect green/yellow ground wire and drain wire to grounding stud adjacent to main power cable inlet.
  - c. Connect blue wire to terminal 4 (L1) and brown wire to terminal 6 (L2).

#### WARNING

The STU shall be protected by a circuit breaker or fusing installed at power source in compliance with local safety codes for current rating of the unit. If a circuit breaker is used, contact separation must be a minimum of 3.0 mm (0.118 in). Nominal cross-section of wiring must be 1 to 2.5 mm<sup>2</sup>.

#### Acceptance of Unit After Unpacking

Be sure to visually inspect the following areas of the STU before applying power:

- o Top cover, cabinet surfaces, and control panel for scratches, cracks, or abrasions.
- o Control panel for damaged switches or indicators.
- o PWA assemblies for damaged connectors and components.
- o PWA alignment and seating.
- o Cable connectors and hoses properly attached.

#### NOTE

If a claim for damage is necessary, be sure that all shipping material is available for evidence of damage, and file claim with carrier immediately.

- o Perform CLEANING procedures described in Section II of this manual.

## Grounding

The STU is connected to earth ground via the power cord. An EMC ground is provided by system-grounding the shielded jackets of the I/O cables. Logic ground is furnished via the interface connector. A single-point grounding scheme is used to connect logic ground to frame/earth ground.

The junction box assembly has two grounding lugs, one for the terminal block ground cable and the other for the main power cable (Figure 3-16).

## CHECKOUT PROCEDURE

The operational checks defined below must be performed prior to submitting the STU to the operating system.

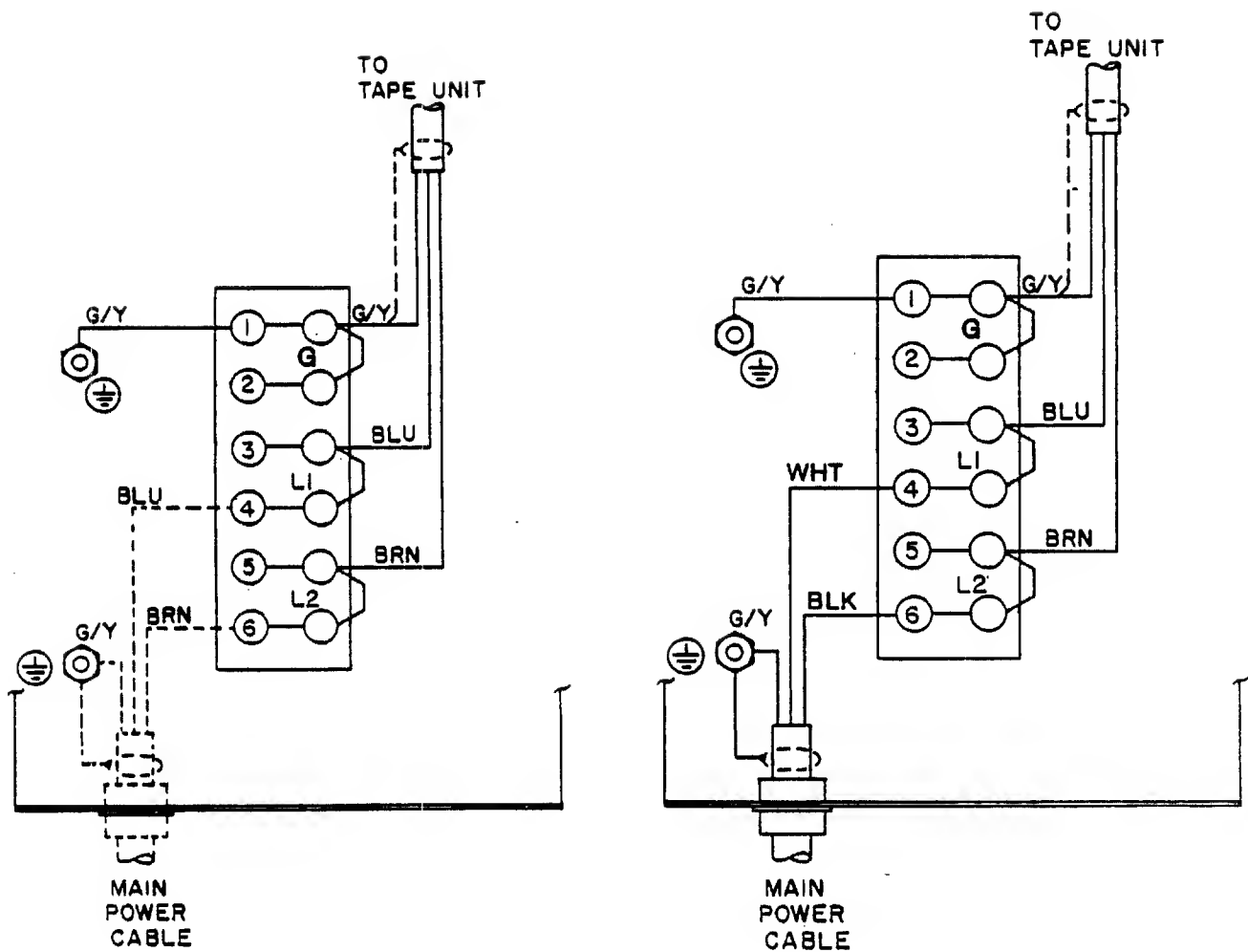
The following procedures require the use of the diagnostic controls on the control panel. If any one of the tests does not perform successfully, a fault code is displayed on the panel. These fault codes are for use by maintenance personnel and should, therefore, be logged in the event of test failure. This logging of fault codes and subsequent reporting to maintenance personnel is not restricted to this installation period, but should be standard operating procedure at all times.

### Primary Power Checkout

1. Check equipment identification plate located on the cross-member inside front door to ensure input power matches requirements on ID plate.
2. Connect power cord to AC power source.
3. Place circuit breaker (top right of tape deck) to ON position (1 pressed). Observe that LOGIC OFF indicator lights.

### Functional Checkout

The functional checkout testing starts with the off-line resident diagnostic to check the tape transport power, logic, and control circuits, power-on health check, and continues with the resident diagnostic to test the tape subsystem (test 01). The acceptance testing must be performed in the following steps:



A) 50 HZ UNITS

B) 60 HZ UNITS

Figure 3-16. Junction Box Wiring Diagram

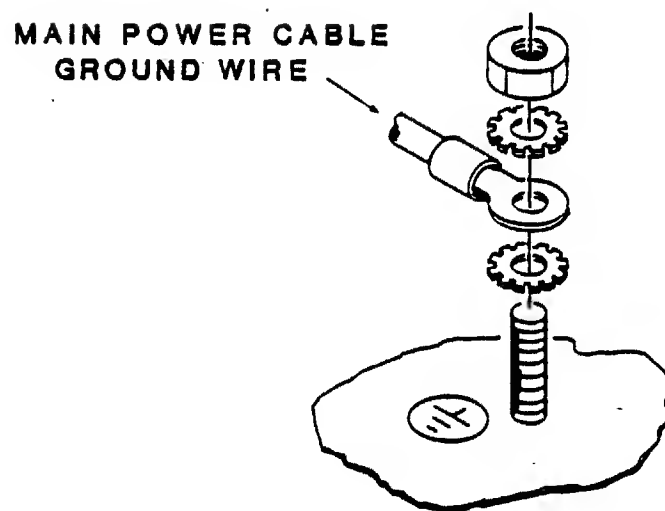
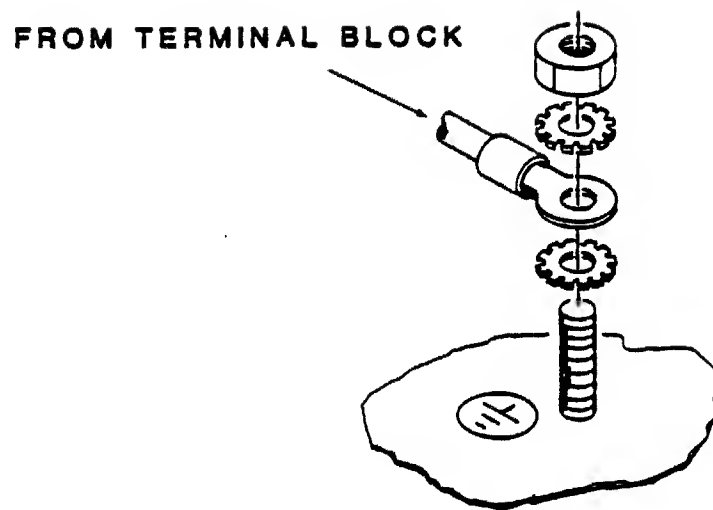


Figure 3-17. Junction Box Grounding Terminals

- o Power-On Health Check

This self-test diagnostic checks dc power and performance of the control panel and major logic circuits of the transport. To start health check, press the circuit breaker on (1 down).

After the power-on health check runs successfully, the LOGIC ON indicator lights. If LOGIC ON indicator fails to light, report the problem to maintenance personnel. If the test is successful, proceed with STU test 01 as described below.

- o Test 01

This resident test checks basic transport functions and tape motions, including BOT/EOT tape motion, read data, and write data. Use a write-enabled, known good quality tape for this test. This test runs to completion in approximately 13 minutes with a 2400-foot long tape.

- o Test Conditions

1. STU powered on (LOGIC ON indicator lit). Built-in diagnostics include a power-on health check when operator presses circuit breaker in ON position (1 down). If a fault occurs at this time, do not attempt further testing; report error code to maintenance personnel.
2. Tape threaded through tape path and onto take-up reel, but NOT loaded.
3. Top cover closed.

- o Test Procedure

1. Press TEST switch on diagnostic portion of operator panel.
  - a. DIAGNOSTICS indicator lights.
  - b. 01 is indicated on display panel.



2. Press EXECUTE switch.
  - a. Test commences with display panel incrementing from 00, 11, 22 thru 99. Verify that all segments of numerical display are functioning.
  - b. Concurrent with step a. above, verify that all indicators except LOGIC OFF, BOT, and HIGH DENSITY are lit.
  - c. Test continues with various motion and read/write exercises for approximately 13 minutes (with 2400-foot reel of tape).
- o Test Successful
  1. If test runs to completion, the STU performs a REWIND/UNLOAD operation and 00 is indicated on display panel, with RESET indicator lit.
- o Test Unsuccessful
  1. If test is unsuccessful, the diagnostic halts and numerical code appears on display, with RESET indicator lit. Record this number.
  2. Refer to table 3-6 for operator action that may resolve fault without maintenance personnel involvement.

Reinitiate test 01 after performing any of the above actions. If test is successful, return STU to normal operation. If fault is not resolved, proceed with step 3.
  3. Report number recorded in step 1 to maintenance personnel.

#### NOTE

Once the STU is in the desired location, use a 1/2 inch open-end wrench to lower the four levelers until the weight of the unit is removed from the casters.

Table 3-6. OPERATOR CORRECTIVE ACTION

FAULT CODE	CORRECTIVE ACTION
01 thru 09	Clean magnetic head and tape path as described in OPERATOR CLEANING PROCEDURES of this manual.
10	Ensure top cover is securely closed.
11	Thread tape.
12	Indicates supply reel hub is not latched, BOT marker located incorrectly, or a tension fault occurred during load operation.
13	Refer to tape threading diagram on tape deck to ensure tape is threaded correctly.
14	Check for BOT marker on tape.
15	Indicates operator pressed RESET switch by mistake. Reinitiate test.
16	Check for presence of write enable ring in rear of supply reel. Install ring if not present.
17	Check for presence of EOT marker.
18	Indicates tape loaded when test was initiated. Thread tape, but do not press LOAD switch.
20 thru 29	Mount a tape of known good quality.
All Others	Report fault code to maintenance personnel.

## PACKAGING INSTRUCTIONS

The following instructions are provided so that if reshipment of the unit becomes necessary, both the unit and cabinet may be safely and securely transported. If any of the original shipping materials are unavailable, substitutes may be used, however, replacement shipping materials may be obtained by contacting:

Laser Magnetic Storage International Company  
2621 Van Buren Avenue  
Valley Forge Corporate Center  
Norristown, PA. 19403  
Attn: OEM Marketing

### NOTE

The following procedures may be referenced to Figures 3-12 and 3-18.

1. Insert two pieces of Ethafoam (F/N 10) P/N 90670515 into the top and bottom pivot brackets located where the PWA board cage hinges at the rear of the tape deck. Insert two pieces of Ethafoam (F/N 11) P/N 90541620 between the rear of the tape deck and back edge of the PC boards in the cage. Secure the logic boards to the cage by using tie-wraps (F/N 13) P/N 94277400, placing them through holes in the PCB (4 corners). Attach a piece of filament tape (F/N 09) P/N 59143067 over the knurled head of the captivated screw and tape to the PCB at two locations.
2. To close and lock the tape deck in the horizontal position, with the deck locked and positioned upright, locate the pivot bracket on the left side. Grasp the ring attached to the spring-loaded locking pin and pull outward to disengage the pin. Rotate the deck toward the front and downward until the locking pin engages the hole and locks the deck in the horizontal position. On the top left-hand side of the deck, locate the large screw head recessed into the deck. Using a screwdriver, turn the screw clockwise, thus causing the pawl on the underside of the deck to engage a metal plate. Tighten the screw until there is no movement or play in the deck.
3. On the right side at the front of the cabinet, assemble a hex screw and nut from the underside of the cabinet up into the deck. Repeat this procedure for the left side.
4. Enclose the cabinet with a poly-bag dust cover P/N 90541604.

TIE WRAP FROM CUT-OUT ACROSS TOP OF FRAME, FEED THRU HOLE IN PCB FROM RIGHT TO LEFT, GO UNDER FRAME AND SECURE AT THE CUT-OUT. TOP SURFACE VIEW WHEN DECK IS IN VERTICAL POSITION.

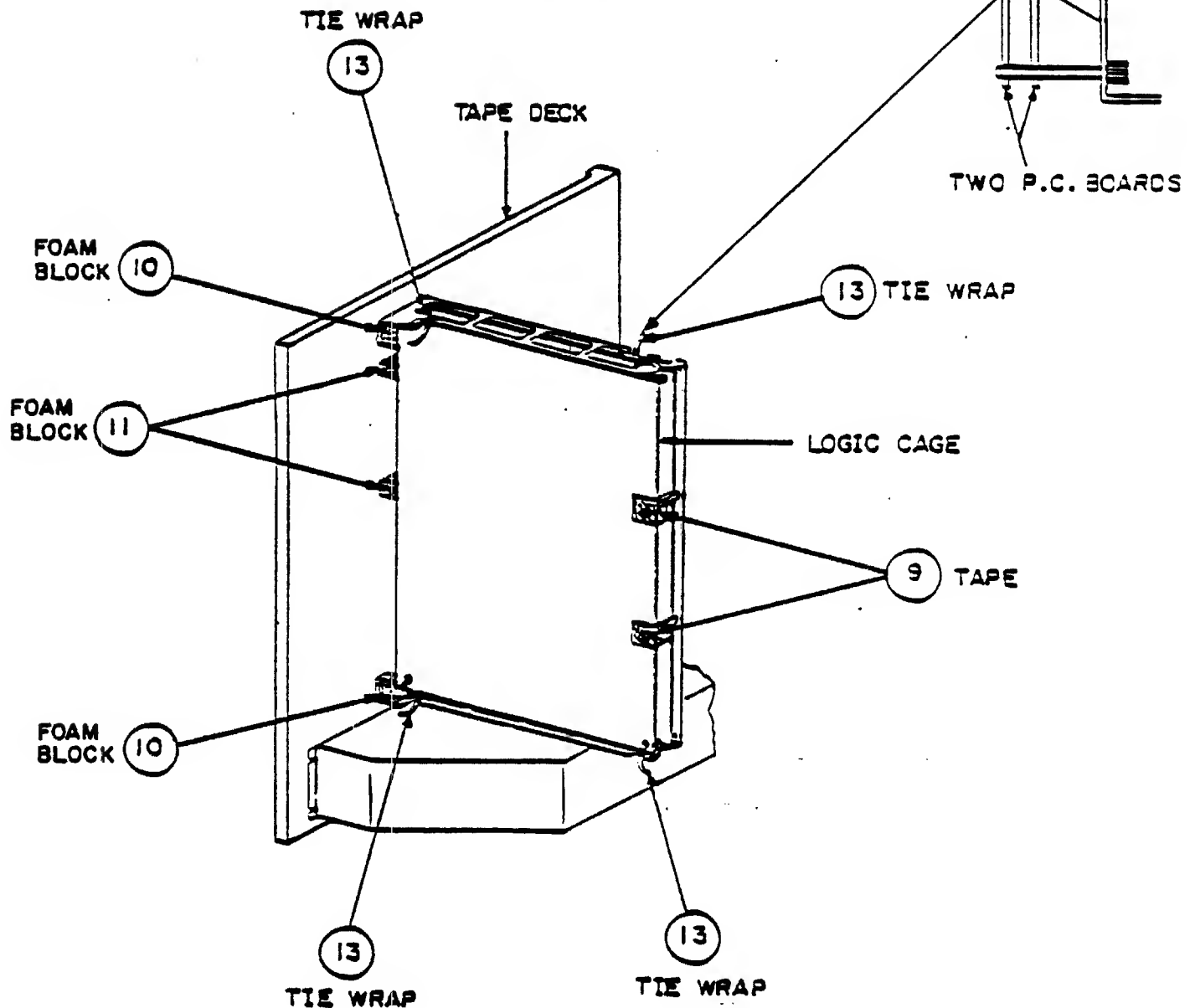


Figure 3-18. STU Shipping Preparation

5. Set up left and right ramp assemblies by inserting the end plate of the ramps into groove in rear of pallet.
6. Raise levelers using a 1/2-inch open-end wrench until cabinet is free to roll. Carefully guide (a two-person operation) unit onto ramps and up onto pallet.
7. Position unit on pallet and lower levelers until casters are not free to roll.
8. Position four shipping brackets to levelers and secure with bolts and washers (using 9/16-inch open-end wrench).
9. Run a length of avis strap under bottom of cabinet from the front to the back and up the rear, across the top and down the front door. Secure avis strap with a buckle down at the bottom. This will prevent the top and front doors from opening during shipment.
10. Position the corrugated shipping carton, P/N 90547202, over the cabinet onto the pallet.
11. Place the protective cardboard liner P/N 90541603 on top of the unit.
12. Place the two ramps side by side on top of the protective cardboard liner.
13. Position the top container cover P/N 90541602 onto the top of the shipping container.
14. Locate four 8-inch long angle boards, P/N 90541619, on the long dimensions, two each side, to the shipping container.
15. Remove the backing and attach the recloseable poly envelope (pouch) to the shipping carton.

## TRANSPORT CONFIGURATION

The STU has several optional features and selectable addresses that must be considered during the installation procedure. Option and address selection components are contained on the Formatter/Control PWA. The following table provides identification of these features and the physical location of component selection. Refer to Figure 3-19 for component identification.

Table 3-7. STU CONFIGURATION

OPTION	COMPONENT/LOCATION	COMMENTS
Channel Parity Check	W1 Positions 1 and 2	Use as if parity bit is not transferred with data.
	W1 Positions 2 and 3	As Shipped - Parity bit transferred with data.
Variable Short Gap (0.6" to 0.9")	W3 Positions 1 and 2	As Shipped.
Fixed Short Gap (0.6")	W3 Positions 2 and 3	
Variable Long Gap (0.6" to 1.2")	W4 Positions 1 and 2	As Shipped.
Fixed Long Gap (1.2")	W4 Positions 2 and 3	
Adaptive Velocity Control (AVC)	W5 Positions 1 and 2	Disables AVC.
	W5 Positions 2 and 3	Enables AVC - as shipped.
Formatter Address 0	S1 - OFF, Location 21D	As Shipped.
Formatter Address 1	S1 - ON	

Table 3-7. STU CONFIGURATION (Cont'd)

OPTION	COMPONENT/LOCATION	COMMENTS
Transport Address 0	S2 - OFF, S3 - OFF at location 21D	As Shipped.
Transport Address 1	S2 - OFF, S3 - ON	
Transport Address 2	S2 - ON, S3 - OFF	
Transport Address 3	S2 - ON, S3 - ON	

NOTE: Jumper W5 - Adaptive Velocity Control. When this option is invoked, rather than selecting 25 ips mode when low speed is commanded, the transport will enter a mode, whereby, the most optimum speed will be chosen to match system requirements. If 100 ips mode gives the best throughput, then this mode will be used. Without AVC enabled, the drive still provides 25 ips streaming. AVC only enables 100 ips. This choice of operating mode will be done automatically by transport and does not require any involvement by the system. This option allows the STU to be interfaced to a standard adapter and to run under standard 1/2 inch tape software, and yet, offer the advantage of streaming. With this option enabled, unit will respond to a Set 100 IPS command in the normal manner.

#### Minimum System Configuration

The minimum system configuration, as shown in Figure 3-20, provides for a single STU to the controller. Terminators for the I/O channel are installed on the Formatter PWA at locations G18 and H25 (see Figure 3-19). Maximum cable length to the controller is 6.09m (20 feet).

#### Maximum System Configuration

Figure 3-20 shows the maximum system configuration consisting of four STU's daisy-chained together. Only the last STU will have terminators installed on the Formatter PWA at locations G18 and H25 (see Figure 3-19). Intermediate units should have the factory installed terminators removed. Maximum total cable length to the controller is 6.09m (20 feet).

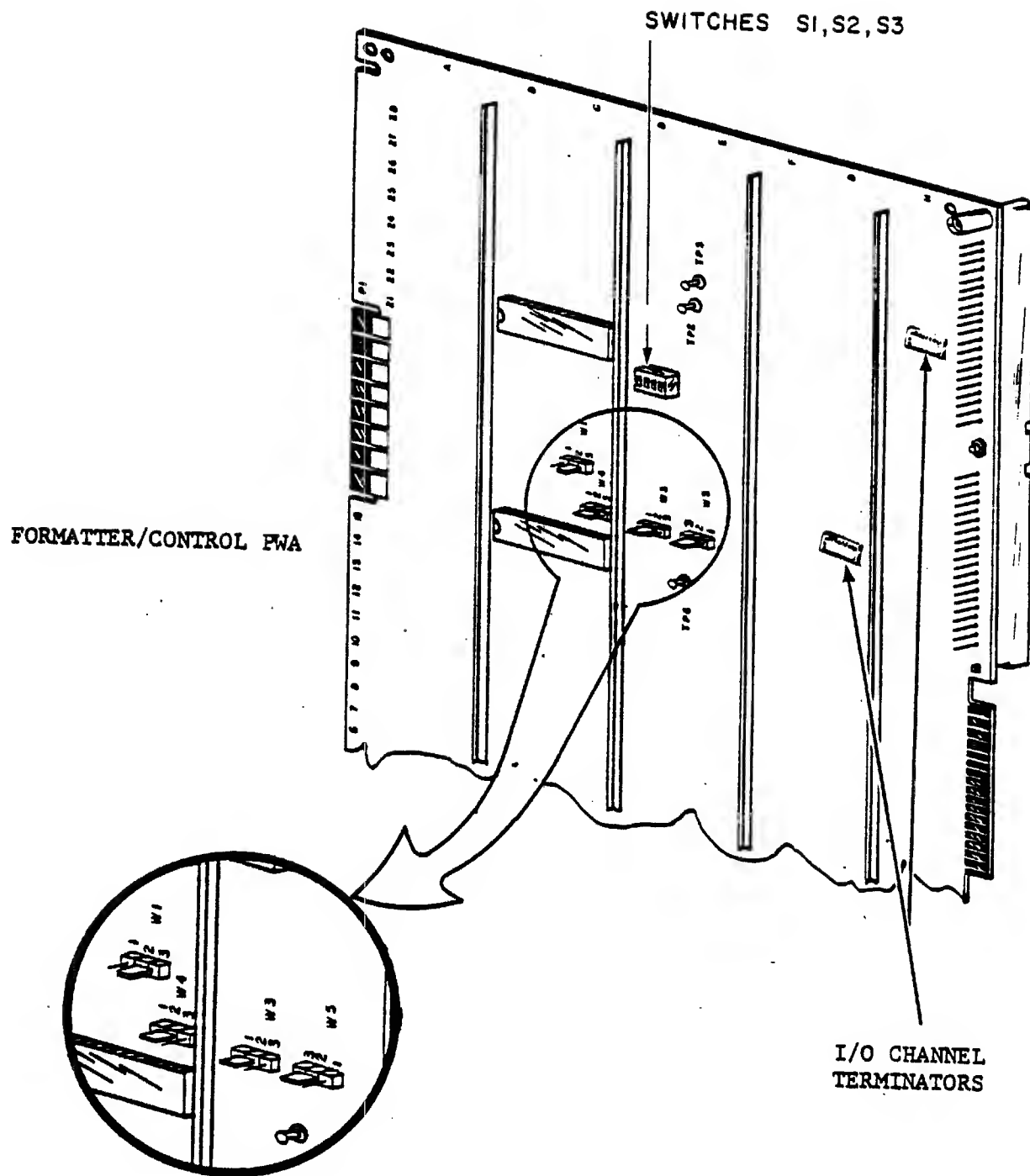


Figure 3-19. Jumper Plug and Switch Locations



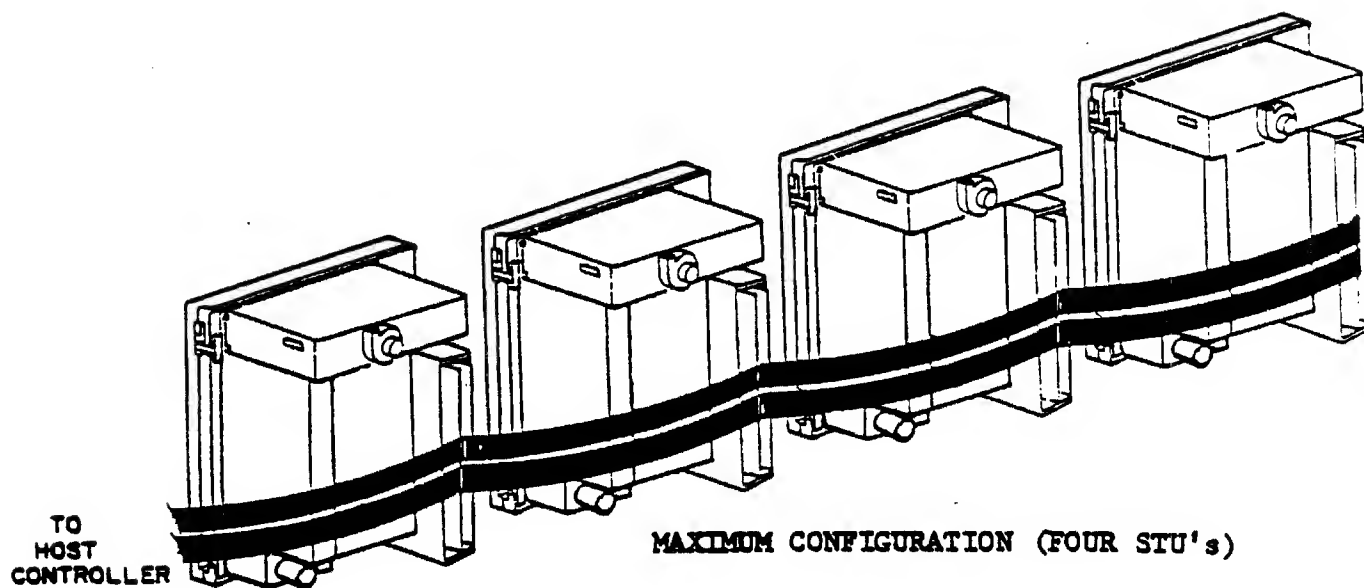
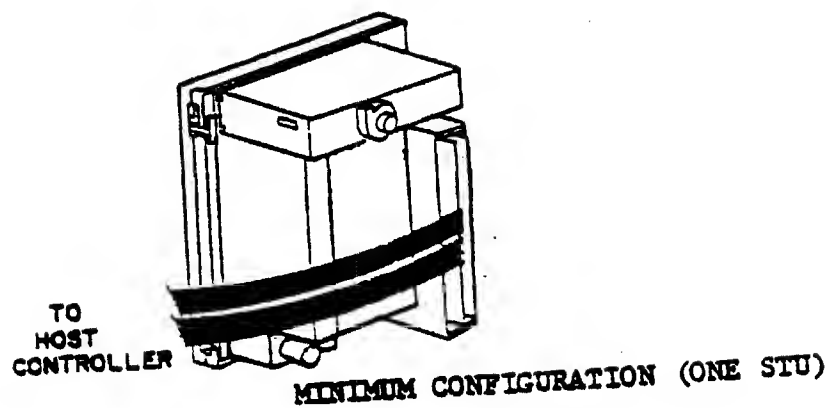


Figure 3-20. Interface Configurations

## ELECTRICAL/MECHANICAL INTERFACE

### Electrical Interface

All lines are low true and driven by 2-state devices, type SN7438. These lines are received by the circuit shown in Figure 3-21. The following voltage levels apply:

	<u>Transmitted</u>	<u>Received</u>
True = 0	0.0V - 0.4V	0.0V - 0.8V
False = 1	2.4V - 5.0V	2.0V - 5.0V

### Mechanical Interface

#### o Connector Requirements

The connectors for this interface are two 50-pin printed circuit edge connectors.

1. 50-Pin Connector CDC 95966510 (AMP 88373-1 or equivalent)
2. Keying Plug CDC 95966560 (AMP 88113-1 or equivalent)

#### o I/O Cable Installation

Two 50-conductor shielded ribbon cables are required to interface the STU with the controller/adapter. The maximum allowable cable length is 20 feet.

The I/O cables are attached to connectors P4 and P5 on the Formatter/Control PWA. Refer to Figure 3-22 for physical pin locations and Table 3-8 for signal to pin assignments.

An I/O cable clamp is provided to mount the I/O cables to the rear of the transport. This clamp, when used as recommended in the following procedure, will ensure proper grounding of the I/O cable shield.

1. Remove approximately 1-1/2 inches of cable jacket on the transport end of the I/O cables (refer to Figure 3-23).
2. Cut the ground shield such that approximately 1 inch of shielding extends beyond the cable jacket.
3. Cut the edges of the shielding to allow the shield to be folded back on both sides of the cable jacket.

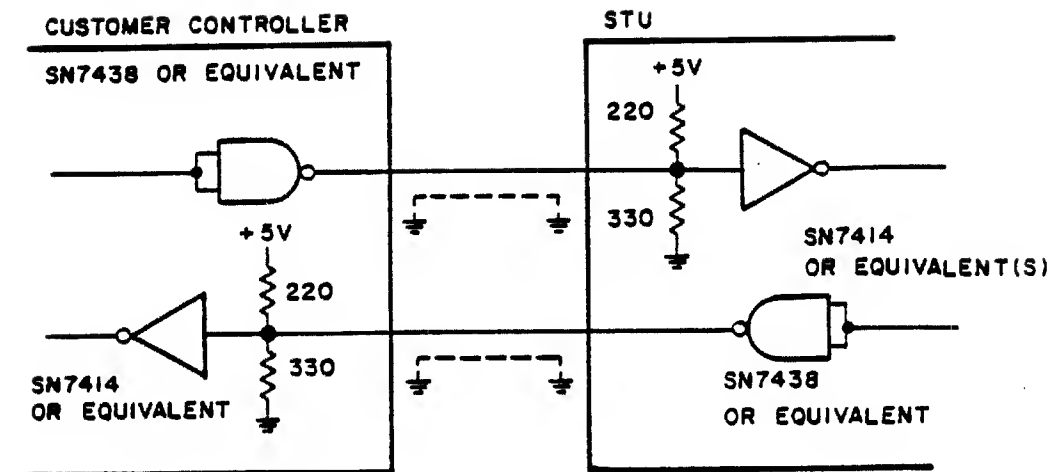


Figure 3-21. Electrical Interface

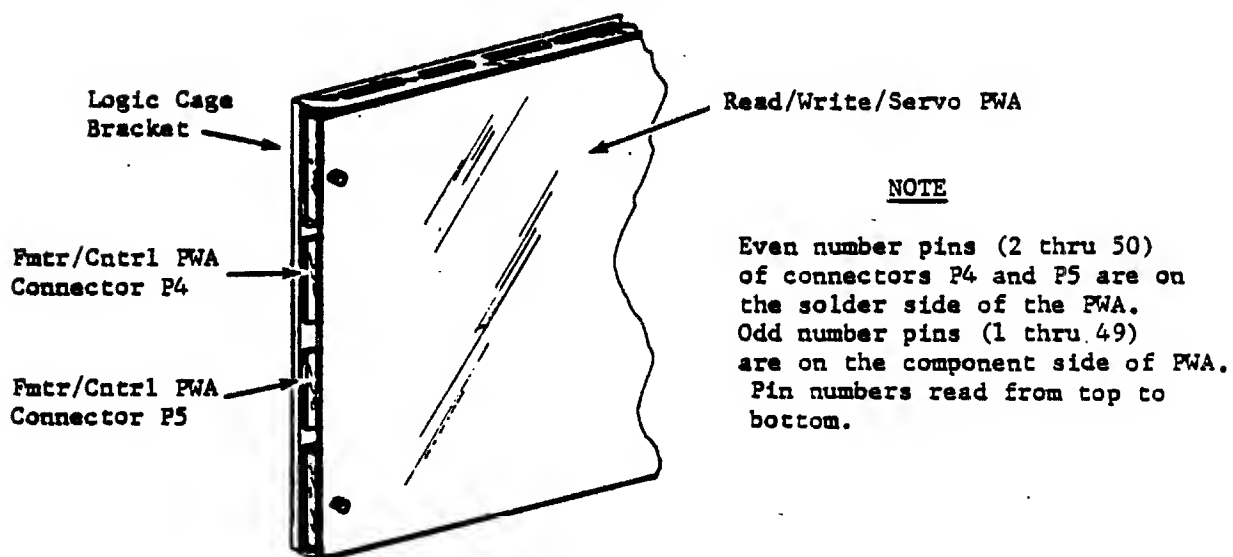


Figure 3-22. I/O Connector Locations

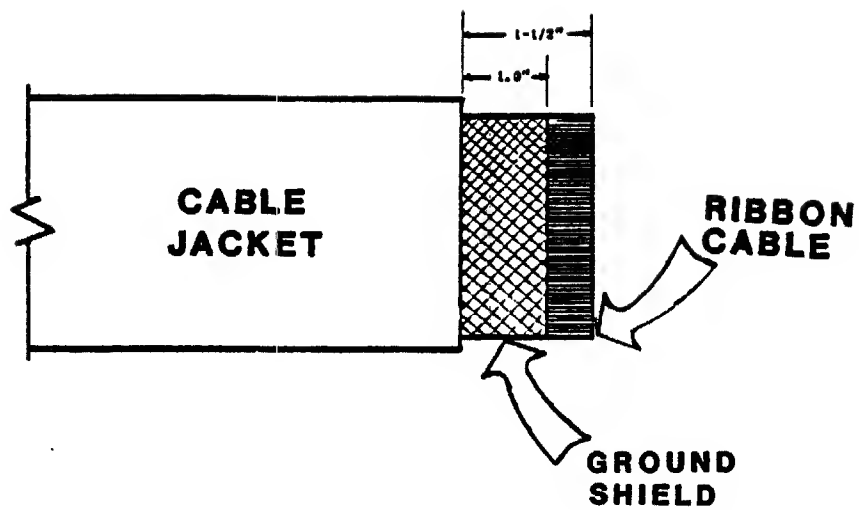


Figure 3-23. Cable Jacket

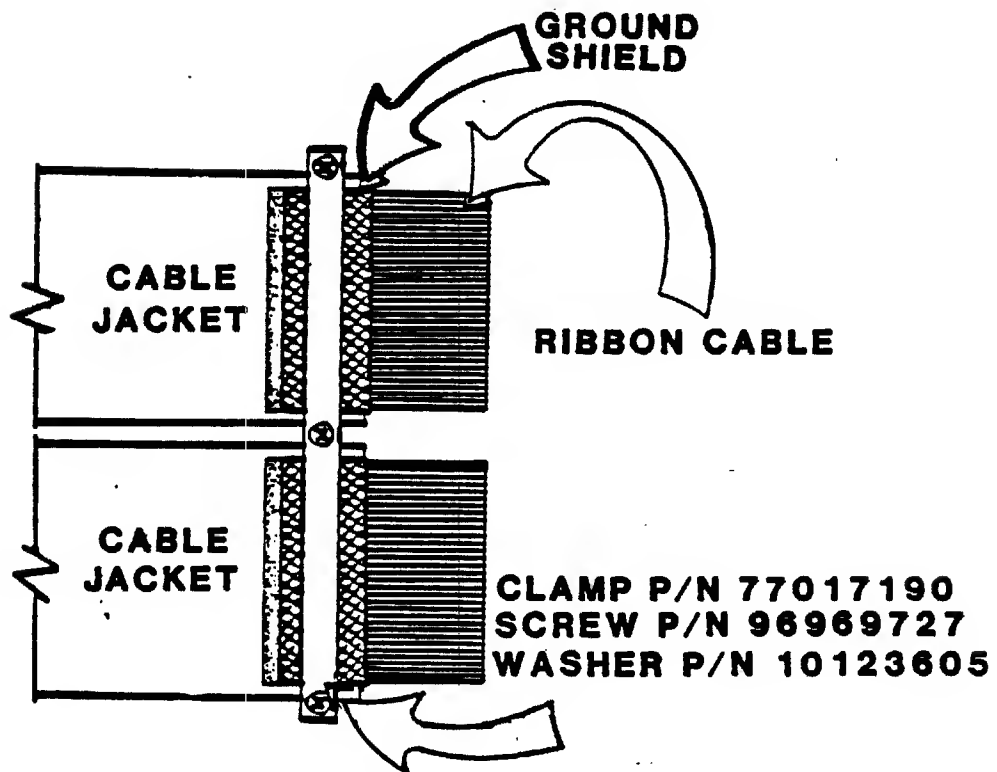


Figure 3-24. Cables With Clamp Strip

#### NOTE

When installing the I/O connectors on the ribbon cable, ensure that the cable length is sufficient to extend from the cable clamp to the I/O board connectors.

4. Install the two 50-pin connectors on the ribbon cable.
5. Mount the I/O cable bracket to the logic cage. See Figure 3-25. Secure the I/O cable bracket with 3 nuts with washers. See Figure 3-25.
6. Install the two 50-pin connectors of the ribbon cable to P4 and P5 on the Formatter/Control PWA.
7. Place the ribbon cables against the logic cage bracket. See Figure 3-25. Place the clamp strip over the cables and secure the clamp strip to the cable bracket with 3 screws and washers. See Figure 3-25. Be sure the clamp strip and the cable bracket make good contact against the ground shield of the ribbon cables. The top and bottom threaded holes in the cable bracket provide additional grounding points, as required. See Figure 3-25.

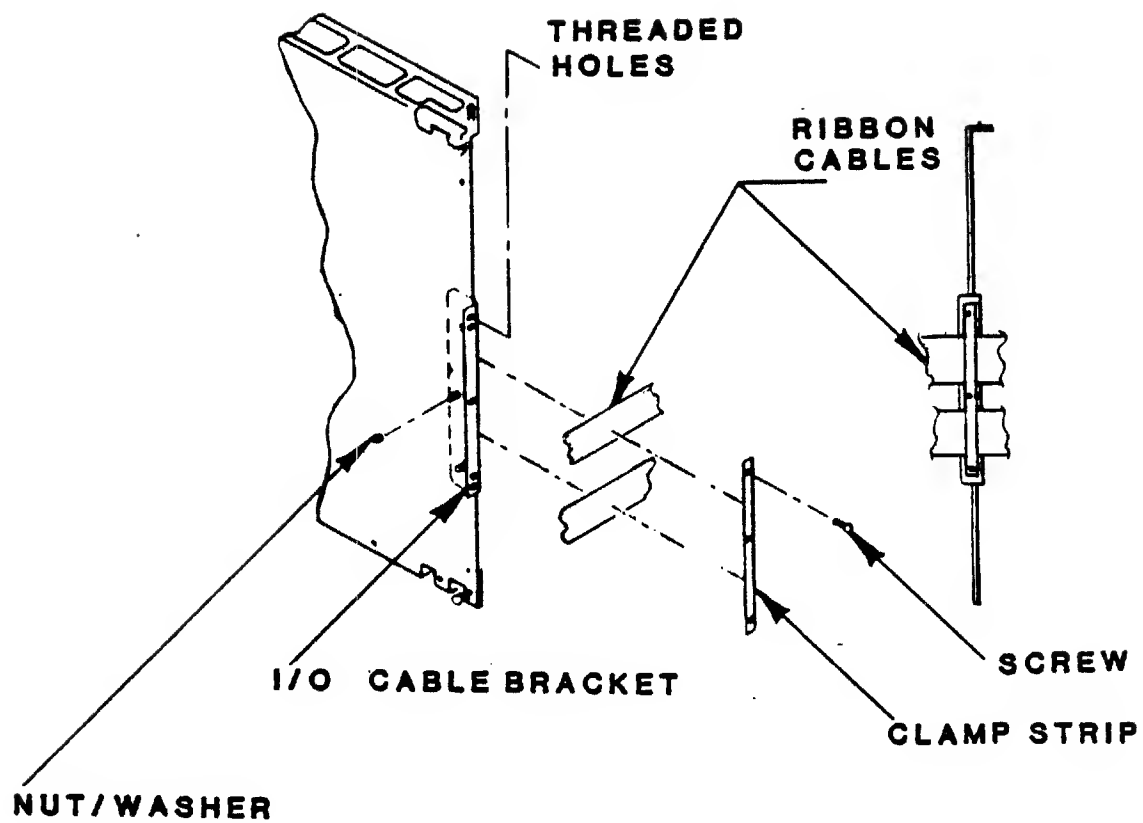


Figure 3-25. I/O Ribbon Cable Installation

Table 3-8. CONNECTOR PIN CONFIGURATION

Connector	Signal Pin	Return Pin	Signal	Connector	Signal Pin	Return Pin	Signal
P4	2	1	FFBY	P5	1	5	FRDP
	4	3	FLWD		2	5	FRD0
	6	5	FWD4		3	5	FRD1
	8	7	FGO		4	5	FLDP
	10	9	FWD0		6	5	FRD4
	12	11	FWD1		8	7	FRD7
	14	13	Spare		10	9	FRD6
	16	15	FLOL		12	11	FHER
	18	17	FREV		14	13	FFMK
	20	19	FREW		16	15	FID
	22	21	FWDP		18	17	FFEN
	24	23	FWD7		20	19	FRD5
	26	25	FWD3		22	21	FEOT
	28	27	FWD6		24	23	FOFL
	30	29	FWD2		26	25	Spare
	32	31	FWD5		28	27	FRDY
	34	33	FWRT		30	29	FRWD
	36	35	FLGAP		32	31	FFPT
	38	37	FEDIT		34	33	FRSTR
	40	39	FERASE		36	35	FDWDS
	42	41	FWFM		38	37	FDBY
	44	43	Spare		40	39	FHSPD
	46	45	FTAD0		42	41	FCER
	48	47	FRD2		44	43	FONL
P4	50	49	FRD3		46	45	FTAD1
				P5	48	47	FFAD
					50	49	FHISP

## Appendix A - SMALL COMPUTER SYSTEM INTERFACE

### GENERAL DESCRIPTION

The Small Computer System Interface (SCSI) is used on Model 92181-05/15 Streaming Tape Unit (STU). For a detailed description of the Small Computer System Interface, refer to Publication No. 49769050, Small Computer System Interface Supplementary Hardware Maintenance Manual.

### SWITCHES

Switch locations are shown in figures A-1 and A-2. The selectable options and addresses with their associated switches are listed in table A-1.

Table A-1. SMALL COMPUTER SYSTEM INTERFACE OPTIONS

OPTION	SWITCH			FUNCTION
SCSI ID No.	ID No.			
Switches	<u>S1</u>	<u>S2</u>	<u>S3</u>	
S1, S2, S3	0	0	0	SCSI ID = 0
Location 1N	0	0	1	SCSI ID = 1
OPEN = 0	0	1	0	SCSI ID = 2
CLOSED = 1	0	1	1	SCSI ID = 3
	1	0	0	SCSI ID = 4
	1	0	1	SCSI ID = 5
	1	1	0	SCSI ID = 6
	1	1	1	SCSI ID = 7
Reset SCSI Bus During Power-On Location 5A	S1	OPEN disabled (As Shipped)		When disabled, does not reset SCSI bus during power-up.
	S1	CLOSED enabled		When enabled, STU generates a RESET which informs all other devices to go to BUS FREE phase.
SCSI Bus Arbitration Location 1L	S1	OPEN disabled		When enabled, the STU SCSI interface performs arbitration. When disabled, does not perform arbitration.
	S1	CLOSED enabled (As Shipped)		

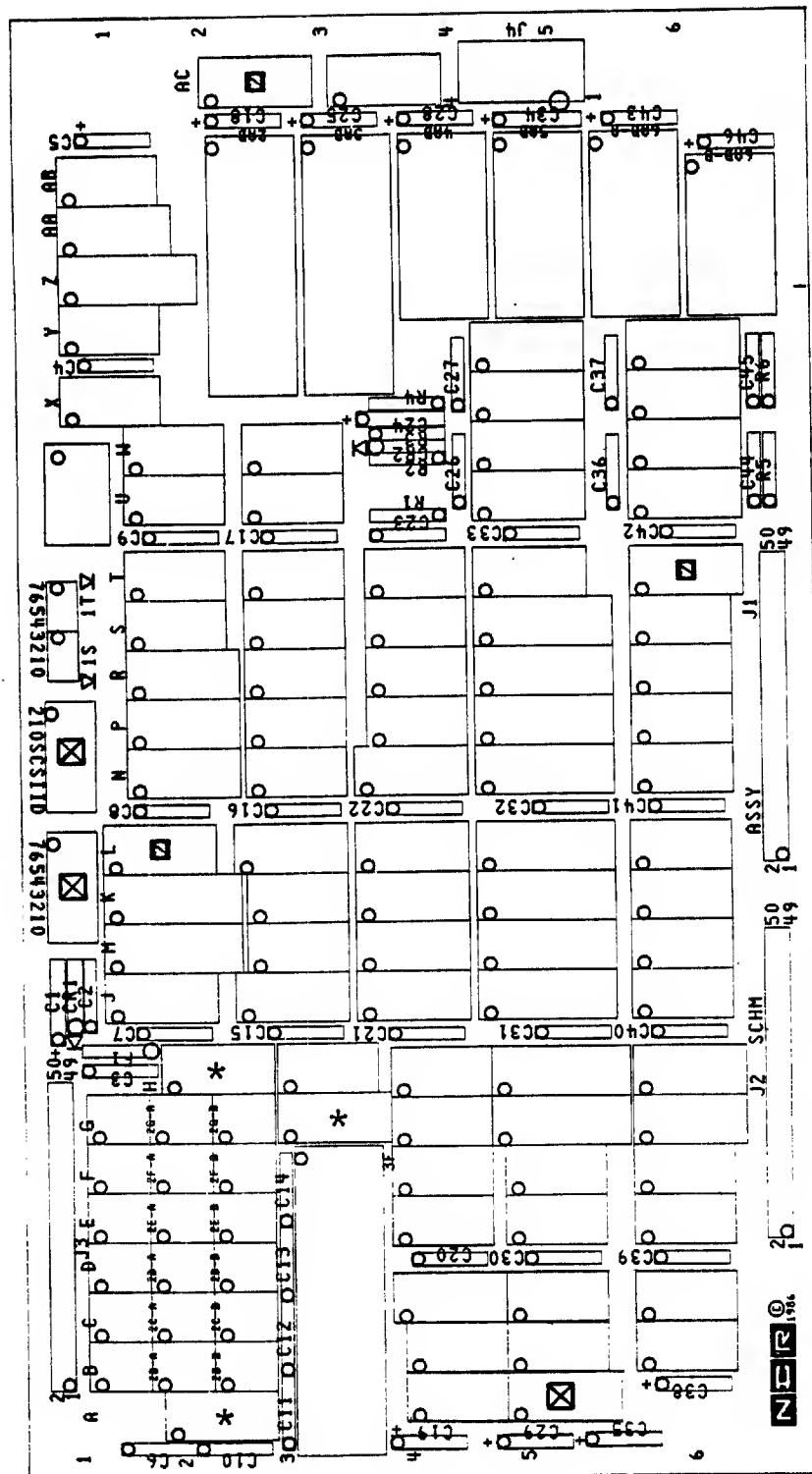


Table A-1. SCSI OPTIONS (Cont'd)

OPTION	SWITCH	FUNCTION
SCSI Bus Parity Checking Location 1L	S2 OPEN disabled S2 CLOSED enabled (As Shipped)	When enabled, the parity of the incoming write data is checked by STU for odd parity and an error is posted if incorrect. When disabled, incoming parity of data is ignored.
Copy Disk Block Size Location 1L	S3 OPEN enabled S3 CLOSED disabled (As Shipped)	When disabled, reads 1 block to determine block size during Copy. When enabled, the SCSI interface assumes copy disk block size to be 512 bytes.
Loop On RAM DATA Dump Location 1L	S5 OPEN enabled S5 CLOSED disabled (As Shipped)	When disabled, STU is in normal operating mode. When enabled, may be used to debug code.
Auto-Error Recovery Location 1L	S6 OPEN disabled S6 CLOSED enabled (As Shipped)	When enabled, automatic read/write error recovery is performed by STU. When disabled, the host has responsibility for read/write error recovery.
Test Switches Location 1L	S4 CLOSED S7 CLOSED S8 CLOSED	Always closed. Always closed. Always closed.
Test Switches Location 1N	S4 OPEN S5 CLOSED S6 CLOSED S7 CLOSED S8 CLOSED	Firmware Reset (Must be open.) Always closed. Always closed. Always closed. Always closed.

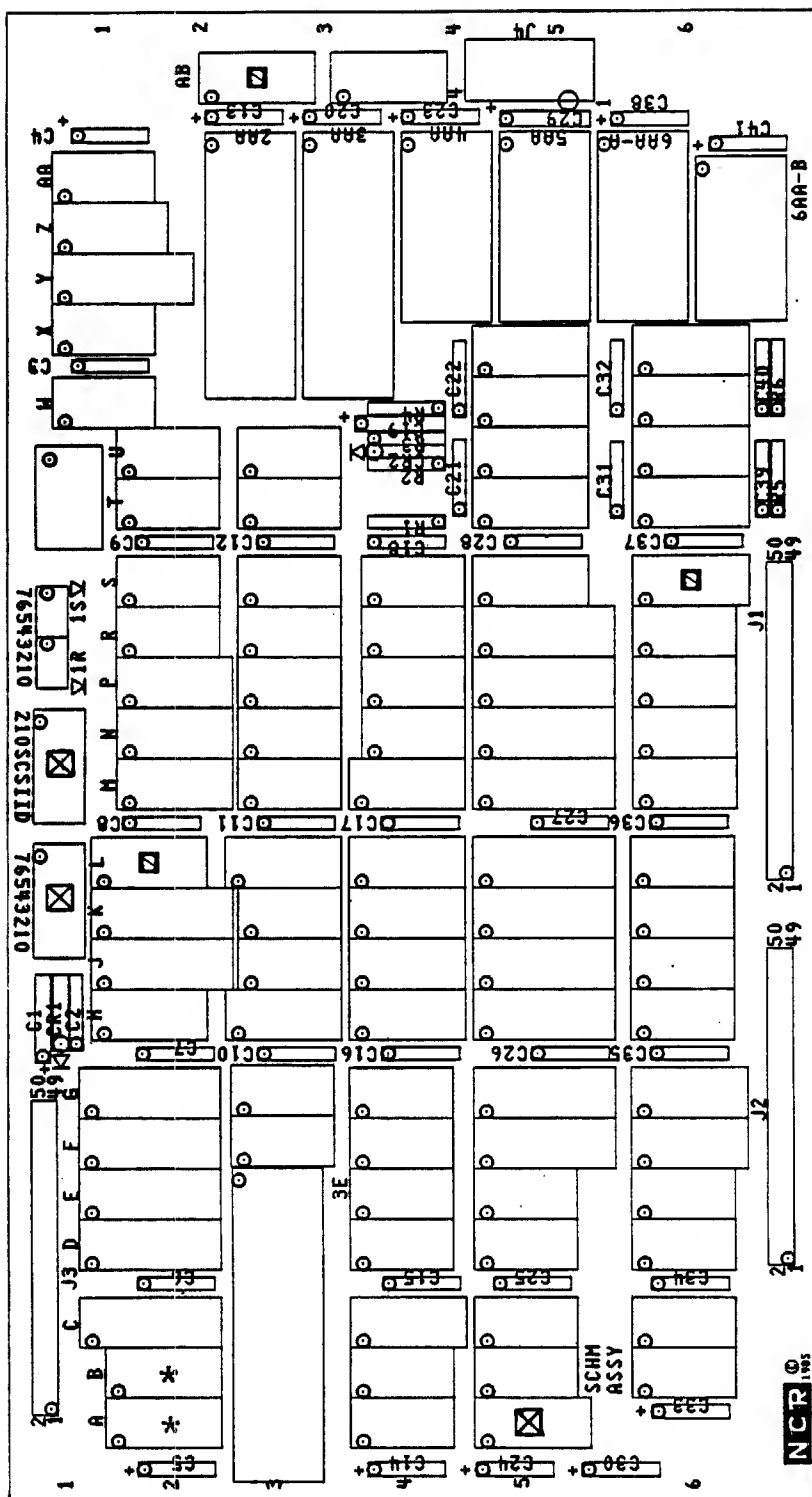
Table A-1. SCSI OPTIONS (Cont'd)

OPTION	SWITCH	FUNCTION
Test	S2 CLOSED	Always closed.
Switches	S3 CLOSED	Always closed.
Location 5A	S4 CLOSED	Always closed.
	S5 CLOSED	Always closed.
	S6 CLOSED	Always closed.
	S7 CLOSED	Always closed.
	S8 CLOSED	Always closed.
Test	S1 CLOSED	Always closed.
Switches	S2 CLOSED	Always closed.
Location 3AB (S.E.)	S3 CLOSED	Always closed.
Location 3AC (DIFF)	S4 CLOSED	Always closed.
	S5 CLOSED	Always closed.
	S6 CLOSED	Always closed.
	S7 CLOSED	Always closed.
	S8 CLOSED	Always closed.



☒ Switches (1P, 1L, 5A)  
 \* SCSI Terminators (2A, 2H, 3G)

Figure A-1. SCSI Interface PWA Switch Locations (Differential)



☒ Switches (1N, 1L, 5A)  
 \* SCSI Terminators (2A, 2B)

Figure A-2. SCSI Interface PWA Switch Locations (Single-Ended)



## COMMENT SHEET

MANUAL TITLE \_\_\_\_\_  
\_\_\_\_\_

PUBLICATION NO. \_\_\_\_\_ REVISION \_\_\_\_\_

FROM: NAME: \_\_\_\_\_  
BUSINESS  
ADDRESS: \_\_\_\_\_

### COMMENTS:

This form is not intended to be used as an order blank. Your evaluation of this manual is welcomed by Laser Magnetic Storage International Company. Any errors, suggested additions or deletions, or general comments may be made below. Please include page number references and fill in publication revision level as shown by the last entry on the Record of Revision page at the front of the manual. Customer engineers are urged to use the TAR.

CUT ALONG LINE

NO POSTAGE STAMP NECESSARY IF MAILED IN U. S. A.

FOLD

FOLD

19403-9990



NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES

**BUSINESS REPLY MAIL**

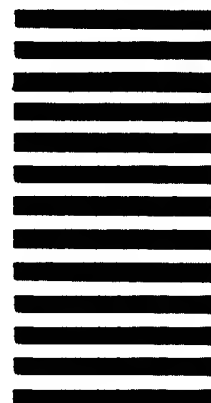
FIRST CLASS

PERMIT NO. 32

NORRISTOWN, PA

POSTAGE WILL BE PAID BY

LASER MAGNETIC STORAGE  
INTERNATIONAL COMPANY  
2621 VAN BUREN AVENUE  
NORRISTOWN, PENNSYLVANIA 19403



ATTN: TAPE STORAGE DIVISION  
TECHNICAL PUBLICATIONS DEPT.

FOLD

FOLD



LASER MAGNETIC STORAGE  
INTERNATIONAL COMPANY  
TAPE STORAGE DIVISION

2621 Van Buren Avenue  
Norristown, PA 19403-2394  
Tel: (215) 666-5000  
Fax: (215) 666-4691